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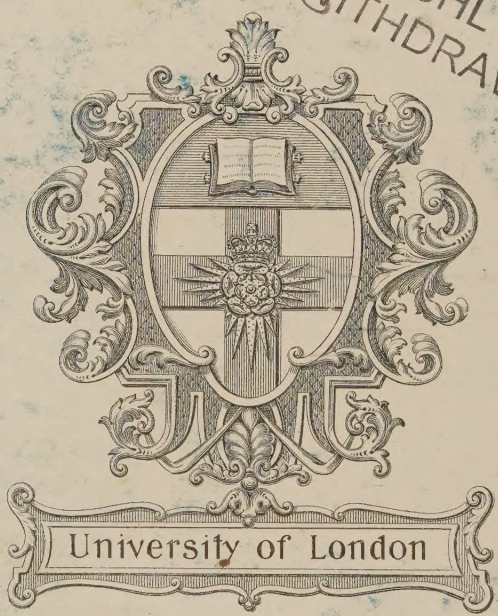

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CHAMBERS'S ENCYCLOPÆDIA

A DICTIONARY OF UNIVERSAL KNOWLEDGE

NEW EDITION

Edited by

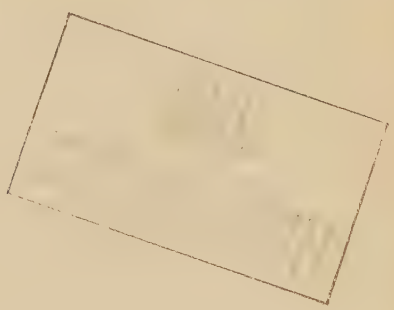
DAVID PATRICK, M.A., LL.D.

AND

WILLIAM GEDDIE, M.A., B.Sc.

VOLUME I

A TO BEATTY



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PREFACE.

INDEX-LEARNING, which

'turns no student pale,
Yet holds the eel of science by the tail,'

has long been held in contempt by scholars and in derision by wits; and the use of encyclopædias is sometimes thought, therefore, to be condemned. Nobody searches the files of *The Eatanswill Gazette* for that review on Chinese metaphysics by the young man who looked up metaphysics under M and China under C, and 'combined his information.' Some encyclopædias have aimed at superseding all other books. Jean de Magnon, dedicating his labour to the glory of God, gave up the writing of tragedy to compose such a one in French verse. 'Death alone,' he said, 'will see the end of my undertaking, which is to give you in ten volumes of twenty thousand lines apiece, a complete body of knowledge, so well conceived and so well set forth, that libraries will be nothing more to you than a useless ornament.' Thanks to an assassin who took him at his word, we have got off with some few thousands of lines, published in 1663. Even worse was the *Yung Lo Ta Tien*, which had lived half a millennium in eleven thousand volumes of Chinese manuscript before the Boxer incendiaries put an end to all danger of its going to press.

Other encyclopædias there are which give no help towards the making of superfluous books, or the making of books superfluous, save so far as their own superfluity goes. They achieve brevity by omitting all that the consultant is likely to wish to learn, all that he is not likely to know already.

Between these two extremes, *Chambers's Encyclopædia* has a character of its own. It strives to be at once comprehensive, compact, accurate, lucid, readable, and handy for reference. The larger themes are broken up into many articles; but provision is throughout made for securing a systematic conspectus of the whole subject. Thus the article GEOLOGY gives a history of the science, and plans out the whole field; while the reader in search of information on single items, such as Plesiosaurus, Boulder Clay, Denudation, Caves, Pitch-stone, Greensand, Mammoth, Coprolites, Dykes, Trilobites, Pterodactyl, the Antiquity of Man, will not have to hunt for these hidden in a trackless wilderness of continuous dissertation, but will find each under its several head. Nor are the articles all so very short as they are sometimes assumed to be. Many of them are equal to forty or fifty pages of a treatise; and the whole, as the increase of knowledge and the unfolding of history warrant, dwarfs Jean de Magnon's conception. We may claim that our assiduous readers will hold the eel of science a good way up the tail; and a glance at the bibliographies which end very many of the articles will prove that we indicate how to exchange that grip for a securer and more comprehensive. We do not desire to be to our readers what our predecessor and namesake Ephraim Chambers was to Doctor Morosophos, whose own book turned out to be but

'CHAMBERS ABRIDG'D! In sooth 'twas all he read
From fruitful A to unproductive Zed.'

Among the more important articles in this Volume are the following:

A..... Dr Henry Bradley.
Aberdeen, Aberdeenshire..... G. M. Fraser.
Abyssinia..... R. W. Felkin, M.D.
Acclimatisation..... Professor J. Arthur Thomson.
Acts of the Apostles Rev. Prof. H. T. Andrews, D.D.
Adam and Eve..... Thomas Davidson.
Adams, John..... William Jacobs.
Adams, John Quincy. J. Thomas, M.D., LL.D.
Addison..... Professor W. J. Courthope.
Æschylus..... Sir John P. Mahaffy.
Africa..... Professor A. H. Keane.
Agnosticism..... Rev. Prof. M'Lellan.
Agriculture..... Sir A. D. Hall, K.C.B.
Alabama..... William S. Walsh.
Albania..... Wadham Peacock.
Alcohol..... W. Inglis Clark, D.Sc.
Alcoholism..... George Gibson, M.D., and Sir John Macpherson.
Alder, Ash..... John Nisbet, D.Œc.
Algæ..... Professor Geddes.
Alkaloids..... W. Inglis Clark, D.Sc.
Allotropy..... Leonard Dobbin, Ph.D.
Alphabet..... Canon Isaac Taylor and Edward Clodd.
Alps..... Professor James Geikie.
Altai..... Prince Peter Kropotkin.
Amazon..... H. C. Walsh.
America..... Charles W. Greene, M.D.
American Indians.... Aleš Hrdlička, M.D.
Amphibia, Amphioxus Professor J. Arthur Thomson.
Anæmia..... Alexander Goodall, M.D.
Anæsthesia..... Arthur W. Hare, M.B.
Analysis..... W. Inglis Clark, D.Sc.
Analysis, Organic... Leonard Dobbin, Ph.D.
Anarchism..... Thomas Kirkup.
Anatomy..... Professor David Hepburn, M.D.
Anchor..... David Pollock.
Andes..... Charles W. Greene, M.D.
André..... Professor John P. Lamberton.
Angling..... W. Senior ('Redspinner').
Animal Chemistry.... Dr William Cramer.
Animism..... Thomas Davidson.
Ant..... Professor J. Arthur Thomson.
Antarctica, Antarctic Ocean... W. S. Bruce, LL.D.
Anthropology..... Professor A. H. Keane.
Aphasia..... George Gibson, M.D.
Apologetics..... Rev. Prof. H. T. Andrews, D.D.
Apparitions..... Frank Podmore.
Aquatic Animals..... Professor Geddes.
Aquatic Plants..... Professor Geddes.
Aquinas..... T. G. Law, LL.D.
Arbitration..... Sheriff J. M. Irvine, K.C.
Arbitration and Conciliation..... Lord Askwith.
Archæan System..... Professor James Geikie.
Archæology..... Joseph Anderson, LL.D.
Archery..... Sir J. Balfour Paul.
Architecture..... Alexander Galletly.
Archpriest..... T. G. Law, LL.D.
Arctic Ocean..... Sir John Murray, K.C.B.
Argentina..... W. A. Hirst.
Argon..... Leonard Dobbin, Ph.D.
Aristophanes..... Rev. H. A. Holden, LL.D.
Aristotle..... Professor David G. Ritchie.
Armour..... Joseph Anderson, LL.D.
Army..... Right Hon. Harold Baker and Captain Johnstone, R.E.
Arnold, Matthew.... A. C. Benson.
Arrest..... Sir Thomas Raleigh, K.C.S.I.
Art..... Sir W. Martin Conway.
Artery..... Professor David Hepburn, M.D.
Arthur..... S. Baring-Gould.
Articles, The XXXIX.. Rev. J. G. Cazenove, D.D.
Artiodactyla, Ascidians..... Professor J. Arthur Thomson.
Asia..... Prince Peter Kropotkin and Professor L. W. Lyde.
Assaying..... W. A. Newman, Royal Mint.
Associations, Trusts, and Cartels..... F. W. Hirst.
Assyria..... Professor A. H. Sayce.
Astrology..... Edward B. Kirk.
Astronomy..... Sir Frank Dyson, Astronomer-Royal.
Athanasian Creed ... Bishop Hensley Henson.
Athens..... Professor Martin L. D'Ooge.
Athletic Sports..... Walter Baxendale.
Atlantic Ocean..... Sir John Murray, K.C.B.
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Atom..... Sir Oliver Lodge.
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Atonement..... Rev. W. Pulsford, D.D.
Audubon..... Charles Morris.
Aurora..... Alex. Buchan, LL.D., F.R.S.
Australia..... A. W. Jose.

B..... Dr Henry Bradley.
Babylonia..... Professor A. H. Sayce.
Bach..... J. Fuller Maitland.
Bacon..... Sir Sidney Lee, D.Litt., LL.D.
Bacteria..... Professor J. Arthur Thomson.
Bagehot..... Thomas Kirkup.
Ballad..... Thomas Davidson.
Balloons and Aeroplanes..... Major Baden Baden-Powell.
Baltimore..... Charles W. Greene, M.D.
Balzac..... Walter Whyte.
Bancroft..... A. K. M'Clure, LL.D.
Bandages..... A. W. Hare, M.B.
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Baptists..... Rev. John Clifford, D.D.
Bark, Bast..... Professor Geddes.
Baron, Baronet..... George Burnett, LL.D.
Barrister..... Sir Thomas Raleigh, K.C.S.I.
Barrow..... Joseph Anderson, LL.D.
Base-ball..... Henry Chadwick.
Basques..... Thomas Davidson.
Bat..... Professor J. Arthur Thomson.
Baths..... T. D. Luke, M.D.
Baxter..... Rev. James Inglis.
Bayeux Tapestry..... J. R. Pairman.
Beacon..... Messrs D. & C. Stevenson.
Beaconsfield..... Francis Hindes Groome.
Beast Fables..... Thomas Davidson.

A great many of the articles named above are new; others written for earlier issues of this Encyclopædia have been so thoroughly revised by their authors as to be virtually new. In addition to these, many other revisers have taken part, including Professor J. A. S. Watson (on Agriculture), Mr Charles Morris (America), Mr C. Inglis Clark and Mr William Morison (Chemistry), Sheriff Irvine and Sir Thomas Raleigh (Law), Professor William Peddie (Mathematics and Physics), Mr R. C. Mossman (Meteorology), Dr John D. Comrie (Medicine), Captain H. M. Johnstone, R.E. (Military Subjects), Admiral Sir Reginald Tupper, K.C.B. (Naval Subjects).

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the first letter of our alphabet, represents historically the first letter of the western Semitic alphabet of twenty-two consonants. Its original sound, still preserved in Arabic, was the 'glottal catch' or 'gasp,' which, though not unknown in European languages (in German it is prefixed to all stressed initial vowels), is not recognised by non-Semitic ears as an articulate sound at all. Hence in popular transcriptions of Semitic words it is left unwritten, as in the Bible names Adam, Enosh, Ichabod, Ornan, Uriah, all which in Hebrew begin with this letter. In more scientific transcription this consonant is often represented by (').

The name of the letter, in Hebrew *'ālef*, in Syriac *'olaf*, in Arabic *'alif*, and in some early Semitic dialect *'alpa* (whence the Greek *alpha*), appears to be identical with the word for ox (Assyrian *'alpu*, Hebrew *'elef*). Its earliest known form was ☇, which looks like a rude outline of an ox's head. Whether this was the origin of the form cannot now be determined. In later Semitic writing the shape of the letter was gradually altered in various directions; in late Hebrew it is ℵ, and in Arabic ا.

Unlike the Semitic tongues, the Greek language did not admit of being intelligibly written without vowels. Hence, when the Greeks adopted the Semitic alphabet, they used the first letter for the vowel-sound with which, in their pronunciation, its name *alpha* began—viz. the vowel which occurs long in the English *calm*, *father*, and short in the Scottish pronunciation of *man*. In early Greek inscriptions the letter had some varieties of shape, but the form A ultimately became general.

The Romans adopted the Greek A without change of form or phonetic value, but for the name *alpha* they substituted *ā*. In late Latin *ae*, *au* were pronounced as simple long vowels, like our *e*, *o* in *there*, *form*; otherwise the sound of the letter remained unchanged.

In those European languages that use the Roman alphabet, English only excepted, A still normally has nearly or exactly its Latin sound. In English since the 14th century the pronunciation has changed more quickly than the spelling, so that now the letter represents several distinct sounds (*n*a*me*, *c*a*re*, f*a*ther, *a*ll, h*a*t, *a*mend). It also occurs as a component of the digraphs *ae*, *ai*, *ay*, *au*, *aw*, *ea*, *oa*, which represent simple vowels, and all (except *aw*) have more than one phonetic value. Our so-called 'long *a*'—the sound which serves as the name of the letter—is the diphthong which the Romans wrote *ei*.

In most of the modern languages in which A usually has its Latin sound, it has also other values in particular collocations. In French the letter has two normal sounds (*â*ge, r*a*ge), and *ai*, *au* represent simple vowels. In German *ae* (commonly written ä, formerly a^e) is pronounced like *e* (but sometimes more open); so also *æ* in Danish and *ä* in Swedish; the Icelandic *æ* resembles our *i* in *time*. The Danish *aa* and Swedish *å* are sounded nearly like *a* in *all*. In Icelandic *á* has the sound of *ou* in *house*, and *au* that of *oy* in *boy*.

The Roman A had an easier form 𝖠, which in medieval MSS. was rounded to ɑ, ɑ, whence our italic and script *a*. In some hands a curve was substituted for the right-hand stroke, yielding the forms imitated in print as 𝔞, 𝒶; in others the letter was written ɑ, and this form, with the prefixed flourish distinctive of capitals, developed into the German printed 𝔄.

The medieval practice of rendering *ae*, when occurring in the same syllable, by a ligature (Æ, æ; in 16th-century print sometimes ę) prevailed in this country in written and printed Latin until quite recently, but is now discarded. In English the ligature is still very commonly used in those words of classical origin (e.g. *æsthetic*) in the spelling of which the *ae* has not given place to *e*; but many of our printers have ceased to use it.

Fuller information about A and the other letters will

be found in the articles ALPHABET, HIEROGLYPHICS, RUNES, WRITING. A is naturally used in many ways as a symbol for the first of a series, as in music (see MUSIC, PITCH, SCALE); as one of the Numerals (q.v.); in algebraic and geometric reasoning; in logic; as one of the Dominical Letters (q.v.). It appears in many Abbreviations (q.v.); A1 is explained at LLOYD'S.

Aa, the name of a number of small rivers in Europe. For its etymology, see AACHEN.

Aa, a Hawaiian word adopted by geologists to denote a rugged lava, in which the surface has rapidly consolidated, and has been broken up into clinkers, and tumbled about by the flow of the stream.

Aabenraa (Ger. *Apenrade*), a town in Danish Sleswick (till 1920 Prussian), at the head of a gulf in the Little Belt (Apenrade Fjord), 66 miles NNW. of Kiel, has a court-house, a school of navigation, and an excellent harbour, with a considerable amount of shipping; pop. 8000.

Aachen, the German name for Aix-la-Chapelle (q.v.), contains a root believed to be Celtic, but certainly identical with Gothic *ahwa*, Old English *éa*, Old Norse *á*, Old High German *Aha*, and Latin *aqua*. *Aix* is from *aquæ*, through *Aigues*. Many small European rivers are called Aa or Ach, and the root occurs in many German place-names, such as Biberach, Bieberich, and Fulda. The Old English word survives in the Lancashire dialect word *ea*, 'watercourse,' 'stream.'

Aahmes, king of Egypt, known by his Greek name of Amasis (q.v.).

Aal, ACH, Hindustani names for Morinda, a tropical genus of plants of the family Rubiaceæ. The flowers are grouped in heads, with ovaries united. *M. citrifolia* and *M. tinctoria* are cultivated in India for the dull reddish dye prepared from the wood and roots, depending for its properties on a glucoside *morindin*. It is believed to protect cloth against termites. Some species are used medicinally in Africa, especially for fever.

Aaland Islands. See ÅLAND ISLANDS.

Aalborg, a seaport in the north of Jutland, on the south side of the Liimfiord, and 90 miles by rail from Aarhus. It has two old churches and a castle, and is the seat of a bishopric; manufactures dairy machinery, cement, corn-brandy, and cotton goods; and, spite of a shallow harbour, exports much Danish produce. Aalborg is connected with Sundby across the Liimfiord by a remarkable iron bridge. The town was plundered by Wallenstein and the Swedes impartially in turn during the Thirty Years' War. Pop. (1925) 42,461.

Aalbuch, a mountainous region in eastern Württemberg. Hohenstaufen and Hohenrechberg, each with a ruined castle, exceed 2000 feet. See HOHENSTAUFEN.

Aalen, a town in the east of Württemberg, on the Kocher, 46 miles E. of Stuttgart, with metal-ware manufactures; pop. 12,000.

Aalesund, a Norwegian town, 150 miles NE. of Bergen, with an excellent harbour, built on three small islands on the coast of the province of Romsdal. A great centre of the herring-fishery, it was burnt down in 1904. It exports herring, cod-liver oil, and fish products. Pop. (1920) 16,412.

Aalia Paakai, a large salt crater-lake of Hawaii, on the island of Oahu, 4 miles from Honolulu. The name is also applied generally.

Aali Pasha, MEHEMET, a Turkish statesman born at Constantinople in 1815, became a clerk in the foreign office, and rose steadily from one diplomatic post to another, at home, Vienna, and elsewhere, till in 1844 he became ambassador at London. His varied experience convinced him of the absolute necessity of extensive reforms in the government of the Ottoman empire; and with these reforms, under the sultans Abdul-Mejîd and Abdul-Azîz, the name of Aali Pasha is identified. He presided at the commission which passed the famous reforming decree of 1856, the Hatti-Humâyûn. At the Congress of Paris he represented the Porte, and maintained its cause with zeal and skill. Grand-vizier more than once, from 1861 till his death (6th September 1871) he held alternately with the like-minded Fuad Pasha the most influential posts in the Turkish service.

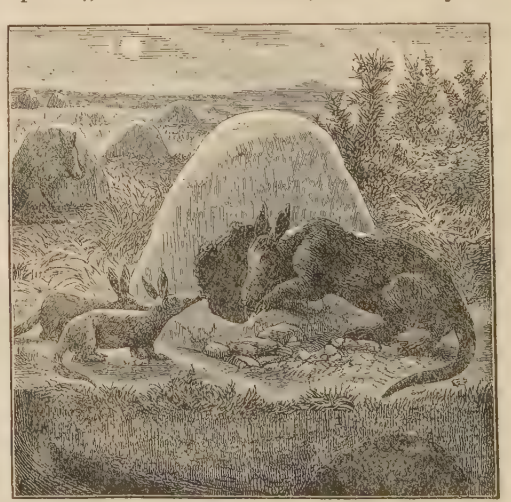
Aalst, or ALOST, a town in Belgium, the old capital of the province of East Flanders, on the Dender, a navigable tributary of the Scheldt, 19 miles NW. of Brussels by rail. It has trade in hops, corn, besides silk, linen, and woollen manufactures, breweries, distilleries, copper and iron foundries. The church of St Martin, an unfinished edifice, is one of the grandest in Belgium, with a famous painting by Rubens, 'St Roche beseeching our Saviour to stay the Plague of Aalst,' and the mausoleum of Marten, Belgium's first printer (1473). Aalst has also a 13th-century town-hall and a Jesuit college. Pop. 36,000.

Aar (Ger. *Aare;* Fr. *Arole*), next to the Rhine and Rhone the largest river in Switzerland, rises in the glaciers of the Bernese Oberland, forms the Falls of Handeck, 150 feet high, flows through the lakes of Brienz and Thun, and passing the towns of Interlaken, Thun, Berne, Soleure, and Aarau, joins the Rhine above Waldshut after a course of 180 miles. Part of its waters is diverted by canal into the Lake of Bienne; its main tributaries are the Reuss and the Limmat. The Aar contributes more water to the united stream than the Rhine. See GLACIERS.

Aarafat. See ARAFAT.

Aarau, capital of the Swiss canton of Aargau (q.v.), near the foot of the Jura Mountains and on the right bank of the Aar, 40 miles NE. of Berne, and 1100 feet above sea-level. It produces mathematical instruments, silks, electric lamps, and other goods. The town was for nearly fifty years the home of Zschokke (q.v.), whose monument (1894) is here. Pop. 10,000.

Aard-vark, or CAPE ANT-EATER (*Orycteropus capensis*), one of the Edentata, and the only ant-



Aard-vark.

eater with teeth. It has seven molars on each side above, and six on each side below, with neither incisors nor canine teeth. It is a stout animal,

with long, pig-like snout, tubular mouth, the usual termite-catching tongue, large ears, fleshy tail, and short, bristly hair. The limbs are short and very muscular; on the fore feet are four, on the hind five, powerful claws, used in burrowing and in excavating the hills of the white ants (see TERMITES), on which it feeds. It is nocturnal in its habits, and is very inoffensive and timid. When pursued it can burrow itself out of sight in a few minutes, working inwards with such rapidity as to make it almost impossible to dig it out. Its total length is about 5 feet, of which the tail is 1 foot 9 inches. The flesh is edible, but from its food is apt to taste of formic acid. The dwelling of the aard-vark (Dutch, 'earth-hog') is a burrow at a little distance from the surface, and thence it may be observed creeping at dusk. Three species are known—one in South Africa, another in Senegal, a third in South Nubia. See ANT-EATERS.

Aard-wolf ('earth-wolf;' *Proteles cristata*), a South African carnivore, belonging to a subfamily of Hyænidæ. It is fox-like in size and habit, but has longer ears and a less bushy tail. It resembles a hyæna in its sloping back, in its colour, markings, and dorsal mane, but has five toes on the forefeet, and the head is much more pointed and civet-like. The back-teeth are small and simple, and there is no carnassial or special cutting-tooth. The strong, blunt claws are, as usual, non-retractile. It feeds on carrion, white ants, larvæ, &c., but not on living vertebrates. It is timid and nocturnal in its habits, social but quarrelsome in its life, and tolerably swift in its pace, though usually trusting rather to burrowing than to flight. See CARNIVORA, CIVET, HYÆNA.

Aare. See AAR.

Aarestrup, EMIL (1800–56), a Danish poet, born in Copenhagen, who came to his fame as one of the greatest lyrists of Denmark only when his poems were published with an introduction by Brandes.

Aargau (Fr. *Argovie*), the least mountainous canton of Switzerland, on the lower course of the Aar, with the Rhine for its north boundary. Agriculture, dairying, cattle-breeding, the production of wine and fruit, manufactures of cotton, and straw-plaiting are carried on. Excellent iron ore was found in 1919. The canton was taken from the Hapsburgs by the Swiss confederates, was long ruled by the aristocratic party, but in 1831 obtained a liberal constitution. The suppression of eight monasteries in 1841 led to the war of the Sonderbund; and the canton has since been democratic and anti-clerical. German is the dominant tongue. Area, 542 sq. m.; pop. 240,000, more than half Protestants.

Aarhus, second in size of Danish cities, is a seaport on the east coast of Jutland, 68 miles NE. of Fredericia, with a very lively transit trade by sea and by rail. Since 951 the seat of a bishop, it has a fine Gothic cathedral dating from 1201, and two modern churches, one of them Roman Catholic. The harbour was much improved in 1880–90. Grain, hides, tallow, butter, bacon, eggs, cattle, and oysters are exported. Industries are iron-founding, brewing, and manufacture of cotton and tobacco. Pop. (1870) 15,025; (1890) 33,308; (1925) 75,271 (with suburbs, 81,210).

Aarlen. See ARLON.

Aaron, elder brother of Moses and High-priest of Israel for forty years, is much more conspicuous in the priestly narrative of the Pentateuch (q.v.) than in the earlier Jehovistic record. See MOSES, HIGH-PRIEST, PRIEST, LEVI, JEWS.

Aaron's Beard, a popular name for (1) *Saxifraga sarmentosa*, usually grown in hanging pots, from which the long stems or runners droop down, bearing at intervals clumps of roundish, hairy, somewhat decorative leaves, with flowers resembling those of London Pride; (2) the Great St John's Wort, *Hypericum calycinum*, also called Rose of Sharon, with a prostrate, creeping, shrubby habit, and bearing very large bright-yellow flowers; (3) *Scorzonera hirsuta*, one of the Compositæ, related to Tragopogon (Goat's Beard), with purplish capitula; (4) the Ivy-leaved Toadflax, *Linaria Cymbalaria* (see TOADFLAX); (5) *Spiræa salicifolia*.

Aaron's Rod, a name given to the Great Mullein (*Verbascum Thapsus;* see MULLEIN), and also to the Golden-rod (q.v.).

Aarsens, FRANS VAN (1572–1641), was long the representative of the United Netherlands at the French court, undertook missions to the courts of the Emperor, of Venice, and of England, and at home was a resolute enemy of Barneveldt (q.v.).

Aasen, IVAR (1813–96), born in the district of Söndmöre in Romsdal, Norway, became eminent as the supreme authority on the Norwegian dialects, of which he wrote a grammar and dictionary; and out of them he tried to construct a national Norwegian language, as distinct from the Dano-Norwegian. In this artificial dialect he wrote (otherwise unimportant) plays and poems.

Aath. See ATH.

Abaca, a species of plantain (*Musa textilis*), which yields a valuable fibre, the so-called *Manila Hemp* of commerce. It is a native of the Philippine Isles, where it is known by the native name of Ab'aca, and extensively cultivated; it is like the Banana (q.v.) in habit of growth, the false stem of sheathing leaf-stalks attaining a height of some 20 or 30 feet, with a large crown of leaves. The leaf-stalks are split into long strips, beaten with clubs, hackled, washed, and dried. From the finer fibres, sometimes 15 feet long, exceedingly fine tissues are woven, mainly for native use. The outer and coarser make extremely durable and tenacious cordage, and are largely exported for that purpose, as also for matting. The old ropes are manufactured into very strong wrapping-paper. The value of the fibre—it is the best of all materials for cordage—has led to its being largely adulterated with New Zealand flax and Russian hemp. 'Hemp' is one of the chief products of the Philippines. The comparative merits of Manila hemp and other materials for ropes are discussed at ROPES; see also BANANA, FIBROUS SUBSTANCES.

Abacænum. See SICILY.

Abaco. See BAHAMAS.

Abacus, an instrument sometimes employed in infant-schools to make the elementary operations of arithmetic palpable. It consists of a frame with a number of parallel wires, on which beads or counters are strung, being variously arranged to represent units, tens, &c. By the ancient Romans it was used in practical reckoning, and it is still in use in some parts of Russia, in the Caucasus, Persia, and China. Probably it passed from the Semites to the Aryans, and so on to the Chinese. In architecture, the abacus is a square or oblong level tablet placed above the capital of a Column (q.v.), and supporting the Entablature (q.v.).

Chinese Abacus.

Abadan, or ABBADAN, an island in the Shatt-al-'Arab, near its mouth, 8 miles by land, 10½ by river, below Mohammerah, has large oil-refineries and a flourishing port. The oil comes from oil-fields 150 miles inland.

Abaddon. See ASMODEUS.

Abakansk, a town in southern Siberia, where the Abakan joins the Yenisei; it has coal-mines.

Abana. See DAMASCUS.

Abancay, chief town of the province of Apurimac in Peru, 65 miles WSW. of Cuzco; pop. 5000.

Abancourt, CHARLES XAVIER JOSEPH D', a French minister during the Revolution, born at Douai in 1758. A nephew of Calonne, and a revolutionist, he advanced rapidly in the army, and became minister of war in June 1792. Two months later he was denounced as a foe to freedom, and was being conveyed to Paris when he was murdered by the mob at Versailles, 9th September 1792.

Abandonment. See DERELICT, SALVAGE, WRECKS; DIET (DESERTION OF), NOLLE PROSEQUI; and for the desertion of wife and of children, HUSBAND AND WIFE, PARENT AND CHILD.

Abarbanel, and ABRAVANEL, are two of the many spellings of the name by which Isaac ben Jehudah, Jewish author and statesman, is known. Born at Lisbon in 1437 of a noble Hebrew stock, and distinguished for wealth, learning, and ability, he was employed in affairs of state by Alfonso V. of Portugal; under his successor he was suspected of treason, and obliged to flee (1483). Next he served Ferdinand of Aragon, but shared in the expulsion of the Jews from Spain (1492), and died at Venice in 1508. His works comprise commentaries on the Bible and philosophical treatises, one of them a commentary on the *Moreh* of Maimonides (see the elaborate article in the *Jewish Encyclopædia*, vol. i. 1901). His eldest son, Juda Leon (Leo Hebræus), was a doctor and philosopher, author of *Dialoghi di Amore* (1535), and a friend of Pico Mirandola (q.v.). Isaac's second son, Joseph, practised medicine in Venice and Ferrara; the third son, Samuel (1473–1550), was finance-minister to the Spanish viceroy of Naples.

Abattis (Fr.) is an entrenchment consisting of trees felled and laid side by side; the butt-ends are fixed in the earth, the smaller twigs cut off, and the branches are directed towards the enemy.

Abattoir. See SLAUGHTER-HOUSES.

Abauzit, FIRMIN (1679–1767), was born of Protestant parentage at Uzès in Languedoc, and on the revocation of the Edict of Nantes (1685) was sent by his mother to Geneva, where ere long he distinguished himself by his zeal and various learning. He travelled in Holland and England in 1698, attracting the notice of such men as Bayle and Newton. King William wished to retain him in England; but his affection for his mother recalled him to Geneva. He helped to translate the New Testament into French (1726), and published many theological treatises (collected 1773).

Abb is the form to which, in St Abb's Head, the name of St Ebba or Æbbe has been contracted. Ebba was the daughter of Ethelfrith, king of Northumbria, sister of Kings Oswald and Oswiu, and aunt of Ecgfrith. Having taken the veil, she founded a monastery at the place called (after her) Ebchester on the Durham Derwent; and was afterwards abbess of a double monastery at or near Coldingham (perhaps actually on the headland of St Abb's), where monks and nuns lived under an abbess. She died about 679. But there seems to have been another Ebba in charge when the monastery was destroyed by the Danes near the end of the 9th century. Long afterwards it was said that this Ebba and her nuns cut off their noses to render themselves hideous in the vikings' eyes, and so save their chastity.

Abbadie, or D'ABBADIE, JACQUES (1654–1727), born at Nay near Pau, of an old Huguenot family, distinguished himself in theology at Saumur and Sedan, and in 1680 was invited by the Elector of Brandenburg to the French congregation in Berlin. There he remained till 1688, writing on the eucharist and the divinity of Christ. Accompanying Marshal Schomberg to Holland and England, he became pastor of the French Church in the Savoy. He wrote in defence of the revolution of 1688, became a favourite with William III., published a panegyric on Queen Mary, and in 1699 was by the king made Dean of Killaloe, though his English was far from perfect, and he was more zealous in polemical theology and politics than in the functions of his deanery. He was practically starved out, and he died at Marylebone.

ANTOINE THOMSON D'ABBADIE (1810–97) and ARNOULD-MICHEL D'ABBADIE (1815–93) were born in Dublin of French family, but educated in France; both of them became famous as travellers in Abyssinia between 1837 and 1848, becoming again Frenchmen. The elder brother, whose veracity was disputed by Dr Beke (q.v.) but was soon triumphantly established, published on his return a catalogue of Ethiopian MSS., the *Géodésie d'Éthiopie* (1860–73); in 1881 a Dictionary of the Amarinna (Amharic) language; and in 1890 *Géographie de l'Éthiopie*, besides papers or treatises on Ethiopic inscriptions and coins, and articles on Abyssinian subjects. He was of the Legion of Honour, and a member of the Académie des Inscriptions. The younger brother's chief publication was his *Douze Ans dans la Haute-Éthiopie* (1868), which was the official record of the travels and observations of both brothers.

Abbas, the uncle of Mohammed, at first hostile to him, but ultimately the chief promoter of his religion, was born in 566, and died 652. He was the founder of the family of the Abbasides, who ruled as khalifs of Baghdad from 750 till the Mongol conquest in 946, but continued to exercise the spiritual functions of the khalifate, first at Baghdad, and from 1258 in Egypt under the protection of the Mamelukes, till 1517 (see MOHAMMED, KHALIF).—For Abbas the Great of Persia, Abbas II., and their dynasty, see PERSIA.

Abbas I., viceroy of Egypt, was grandson of the famous Mehemet Ali (Mohammed Ali), founder of the dynasty. Born in 1813, he had already taken an active part in his grandfather's Syrian war (1840–41), when in 1848 the death of his uncle, Ibrahim Pasha, called him to the viceregal throne at Cairo. During his brief reign he did much to undo the progress that had been made under Mehemet Ali, and, bigoted and sensual, proved a bitter enemy to foreigners. At the Crimean war he put 15,000 men at the disposal of the Sultan. He was found dead—probably murdered—on the 13th July 1854.—ABBAS II., Khedive of Egypt, was born in 1874, and succeeded his father, the blameless Tewfik (son of the scandalous Ismail, who again was son of Ibrahim), on the throne of Egypt in 1892. Abbas, called Abbas Hilmi or Helmy, was studying at a college in Vienna when his father's death called him, at the age of eighteen, to the responsibilities of government. Tewfik had been a discreet supporter of the British régime, but Abbas not unnaturally fell under the influence of intriguers, who encouraged him to assert himself against foreign domination, and for some years he was a serious obstacle to good government, the reorganisation of Egyptian finance and irrigation, and social reform. He sought to thwart Lord Cromer, and quarrelled with Lord Kitchener, then Sirdar; but the reconquest of the Egyptian Sudan from the Khalifa, the successor of the Mahdi (q.v.), by the reorganised Egyptian army supported by British troops, under Lord Kitchener (1896–98), brought about a working agreement, and in 1899 the Khedive paid a friendly visit to England. When war broke out between Britain and Turkey (November 5, 1914) Abbas Hilmi, who was in Constantinople at the

time, adhered to the Turkish side. He was accordingly deposed, and Egypt was proclaimed a British protectorate under a sultan, Hussein Kâmil, Abbas Hilmi's uncle (December 19, 1914). See EGYPT, and Lord Cromer's *Abbas II.* (1915).

Abbas Efendi. See BÂBÎ.

Abbasides. See KHALIF.

Abbas-Mirza (1783–1833), Persian prince and warrior, the favourite son of the Shah Feth-Ali, convinced of the advantages of Western civilisation, applied himself, with the help of European officers, to the reform of the army, and led the Persians with great bravery, but with little success, in the wars with Russia in 1811–13 and 1826–28.

Abbate, NICCOLO DELL' (1512–71), famous as a fresco-painter, was born in Modena, and painted there, at Bologna, and at Fontainebleau, where he died after working on the château for nearly twenty years. There is an altarpiece by him at Dresden.

Abbazi'a (Slov. *Opatija*), an Italian health-resort on the bay of Fiume, at the head of the Quarnero, in what was till 1918–19 the Austrian province of Istria, in a district originally occupied by Slavs (Morlaks), but before that date thoroughly Italianised. The town, largely consisting of villas and beautiful gardens with luxuriant greenery, is named from an old abbey. In 1921 Abbazia (with Volosca, 2 miles distant) had a pop. of 5062.

Abbé, originally the French name for an abbot, but often used in the general sense of a priest or clergyman. By a concordat between Pope Leo X. and Francis I. (1516), the French king had the right to nominate upwards of 200 *Abbés commendataires,* who, without having any duty to perform, drew a third of the revenues of their monasteries. They were not necessarily clergy, but were expected, unless exempted by a dispensation, to take orders. The hope of obtaining one of those sinecures led multitudes of young men, many of them of noble birth, to enter the clerical career, which, however, seldom went further than taking the inferior orders. They formed a considerable and influential class in society; and an abbé, distinguished by a short violet-coloured robe, was often found as chaplain or tutor in noble households, or engaged in literary work. This class of nominal clergy disappeared at the Revolution. But the word abbé is still applied in a vague and courteous sense to almost any young clergyman, or any one wearing ecclesiastical dress, especially if he is not exercising ecclesiastical functions, but serving as tutor or professor.

Abbe, CLEVELAND (1838–1916), astronomer and meteorologist, was born in New York city, and educated there, at Ann Arbor, and at Cambridge (Mass.). After some years at Pulkova in Russia, he established at Cincinnati (1869) a system of daily weather forecasts which he was summoned by the government to continue at Washington. He also initiated the American system of standard time and hourly meridians; was professor of Meteorology at George Washington University, 1885–1910; taught his science at the Johns Hopkins University in Baltimore; was meteorologist in the U.S. Weather Bureau from 1891; wrote several meteorological treatises and edited various weather-periodicals.

Abbeokuta, or ABEOKUTA, a city, or rather collection of small towns or villages, capital of a territory in the Yoruba country, in the south-west of the British protectorate of Nigeria. It is about 80 miles N. of Lagos, and is situated 560 feet above the sea-level, on an undulating plain. The city is surrounded by a high wall of hardened mud, from 18 to 20 miles in circumference; the town proper measures 4 miles by 2. There is trade in palm-oil and European goods. Pop. 100,000.

Abbess. See ABBOT, MONACHISM, NUN.

Abbeville, a prosperous manufacturing town of France, in the department of Somme, stands on the river Somme, 12 miles from its mouth, and 49 miles south of Boulogne. It is built partly on an island, partly on the banks of the river. The west front of the church of St Wolfram, commenced in the reign of Louis XII., is a splendid example of the Flamboyant style, with noble portals and covered with rich tracery; Ruskin called Abbeville 'the preface and interpretation of Rouen.' The museum has a rich collection of antiquities. Abbeville manufactures woollens and linens, hemp goods, sacking, and sugar; there is some shipbuilding, and a brisk trade in grain and local manufactures. Near Abbeville were found, by Boucher de Perthes (q.v.) in 1841, the flint implements, associated with the remains of the mammoth and rhinoceros, which have such an important bearing on the controversy as to the antiquity of man. The treaty by which Henry III. surrendered to the French king Normandy, Touraine, Maine, and Anjou was negotiated at Paris, but is named from Abbeville, where Henry met Louis IX. in 1259. Another treaty was actually negotiated in 1527 at Abbeville, by Wolsey, between Henry VIII. and Francis I. Pop. (1921) 20,472.

Abbey. See ABBOT, MONASTERY, MONACHISM, NUN, SANCTUARY.

Abbey, EDWIN AUSTIN, painter, was born at Philadelphia, 1st April 1852, and studied and practised drawing and painting at Philadelphia and New York, becoming known first as a book-illustrator in black-and-white, and a painter in water-colours. Having come to England in 1883, he won recognition as a powerful painter, specially distinguished for canvases dealing with Shakespearean subjects, such as Richard III., Hamlet, and Lear's Daughters. He attained the dignity of A.R.A. in 1896, and of R.A. in 1898, and died 1st August 1911. See Life by E. V. Lucas (1921).

Abbey Theatre. See GREGORY (LADY), SYNGE, YEATS.

Abbot, a word derived from the Aramaic *abba,* 'father,' through the Latinised form *abbas,* was at first used of reverend persons, especially aged monks, but was ere long reserved, as a title of dignity, for the head of a monastery or abbey. Until the beginning of the 10th century, the head of every monastery was called abbot; but after the reformation of the order of Benedictines, monasteries arose that were dependent upon the mother-monastery of Clugny and without abbots, being presided over by *priors* or *pro-abbates.* Many of the orders founded after the 10th century rejected the title, and called their superior *præpositus* or *prior* (as the Carthusians, Dominicans, Carmelites, Augustinians), *custos* or *guardian* (as the Franciscans), *major* or *rector.* The relation of the abbot to his order on the one hand and to his monks on the other varied greatly in the different orders; the Benedictine abbot was wholly independent, while a supreme council at Clairvaux might interfere in the management of all the Cistercian communities. But the abbot was always entitled and bound to enforce the observance of the rules of his order, to administer the goods of the monastery, and to exact unconditional obedience from his monks. Since the 6th century, at least in the Eastern Church, abbots have generally held clerical orders, but at first, and in the Western Church even down to the 11th century, they were not necessarily priests. By the second Nicene Council (787), abbots were empowered to consecrate monks for the lower sacred orders; but they remained in subordination under their diocesan bishops until the 11th century. As abbeys became wealthy, abbots increased in power and influence; many

received episcopal titles; and all were ranked as prelates of the church next to the bishops, and had the right of voting in church-councils. Even abbesses contended for the same honour and privileges, but without success. In the 8th and 9th centuries, abbeys began to be granted by the kings to laymen as rewards for military service; professedly they were granted only temporarily *in commendam*. Occasionally an abbey voluntarily elected a powerful noble as its head for the sake of his protection, the titular abbot enjoying the revenues, but interfering little with the management of his abbey. In the 10th century, many of the chief abbeys in Christendom were under lay-abbots (*Abbates milites* or *Abba-comites*), while subordinate deans or priors had the spiritual oversight. The members of the royal household received grants of abbeys as their maintenance, and the king kept the richest for himself. Sometimes convents of nuns were granted to men, and monasteries to women of rank. Gradually it became not unusual for one man, lay or ecclesiastic, to hold two or more abbacies at once; but these and the like abuses were, in a great measure, reformed during the 10th century.

The abbot was usually under the jurisdiction of his diocesan bishop; but there were many cases of exempted abbots, who acknowledged no superior but the pope. They then exercised a quasi-episcopal authority over what was practically their diocese, and enjoyed the right to wear the episcopal insignia—an honour often granted without exemption from the authority of the bishop, but conveying the rank of *mitred abbot*. In England there were twenty-four mitred abbots, who, however, sat in parliament simply as holding baronies under the crown. On the Continent, not a few abbots had princely titles and privileges, voting in the national councils. The election of an abbot belongs, as a rule, to the chapter or assembly of the monks, and is afterwards confirmed by the pope or by the bishop, according as the monastery is independent or under episcopal jurisdiction. But from early times, the pope claimed the right of conferring many abbacies, and the concordat of 1516 gave a similar privilege to the king of France. Popes as well as princes frequently abused this recognised or usurped power by giving abbacies to members of the secular clergy, who were accordingly not bound by monastic rules (see ABBÉ). Such abbots were *secular abbots*, while those subject to the rule (*regula*) of a monastic order were *regular abbots*. In countries which embraced the Reformation, the possessions of abbeys were mostly confiscated by the crown; but in Hanover, Brunswick, and Württemberg several monasteries and convents were retained as educational establishments, the heads of which retained the title of abbot or abbess. In the Greek Church, the superiors of convents are called *Hegumeni* or *Mandrites*, and general abbots *Archimandrites*. Amongst Copts and Syrians, *abba* is a title given to bishops or patriarchs. The head of the Abyssinian Church is called *abbuna* ('our father'). An abbess, the superior of a religious community of women, corresponded in rank and authority to an abbot, except in not being allowed to exercise the spiritual functions of the priesthood—such as preaching or confession. See MONACHISM, NUN.

Abbot, EZRA, scholar and biblical critic, was born in Jackson, Maine, 28th April 1819; studied at Bowdoin College; in 1856 became assistant-librarian at Harvard University; and in 1872 was chosen professor of Biblical Criticism in the Harvard divinity school. He wrote much for the periodicals, helped in preparing the American edition of Smith's *Dictionary of the Bible*, assisted Dr Caspar René Gregory in the prolegomena to the *editio octava major* of Tischendorf's Greek New Testament, and was a member of the New Testament Revision Company. Among his works are *New Discussions of the Trinity, Literature of the Doctrine of a Future Life, Critical Essays* (1888), and *The Authorship of the Fourth Gospel* (1880; extended 1888). He died 21st March 1884.

Abbot, GEORGE, Archbishop of Canterbury, was the son of a Guildford cloth-worker, and was born 29th October 1562. In his seventeenth year he entered Balliol College, Oxford, where he obtained a fellowship (1583); and through Lord Buckhurst's influence he rose to be Master of University College (1597), Dean of Winchester (1600), and thrice Vice-chancellor of Oxford University (1600–5). To a new patron, the Earl of Dunbar, with whom he visited Scotland (1608), he owed his promotion to the sees of Lichfield (1609), of London (1610), and finally of Canterbury (1611). A sincere but narrow-minded Calvinist, he was equally opposed to Catholics and to heretics, Arian or Arminian. He fined two recusants, he burnt two Arians, he consented that a clergyman should be put to the torture; but, withal, he was charitable, and far less obsequious to the kingly will than most of his compeers. His closing years were clouded by an accident, the shooting of a gamekeeper (1621); and during the last six he was almost superseded by his great adversary, Laud. He died at Croydon, 4th August 1633, and was buried at Guildford, where in 1619 he had founded a hospital.—His brother, ROBERT (1560–1617), was a learned theologian, and from 1615 Bishop of Salisbury.

Abbot, CHARLES. See COLCHESTER (LORD).

Abbotsford, the seat of Sir Walter Scott, stands on the south bank of the Tweed, a little above its confluence with Gala Water, and 2 miles W. of Melrose. Before it became, in 1811, Sir Walter's property, its site was the small farm of 'Clarty Hole;' the new name recalled the days when Melrose abbots forded the Tweed at this spot. Here he built a small villa, now the western wing; and in 1817–24 he added the other portions of the building, combining in it some of the features (and even actual remains) of those ancient works of Scottish architecture which he most venerated. The result was that picturesque irregular pile, that 'romance in stone and lime,' which is further a veritable museum of historical curios and personal relics of Scott. Through Mrs Lockhart and her daughter (Mrs Hope Scott) it passed to Scott's great-grand-daughter, the Hon. Mrs Maxwell-Scott (1852–1920). For the Abbotsford Club, see BOOK-CLUB.

Abbott, CHARLES. See TENTERDEN (LORD).

Abbott, EDWIN ABBOTT, theologian and philologist, was born in London (20th December 1838). After a brilliant career at St John's, Cambridge, he obtained a fellowship, was master at King Edward's School, Birmingham, and at Clifton College, and from 1865 to 1889 was headmaster of the City of London School, where he devoted much attention to the furthering of the study of English literature. He stood in the front rank of the more liberal theologians within the English Church; his view of Christianity he stated in *Through Nature to Christ* (1877). *Philochristus* and *Onesimus*, two anonymously published romances of the first age of the church, were by him, as was *The Kernel and the Husk* (1887), an amplification of the same view of Christianity. *Philomythus* (1891) and the articles on the gospels in the *Encyclopædia Britannica* (1879) and *Encyclopædia Biblica* were also theologically 'advanced.' His *Shakespearian Grammar* (1870) was followed by works on Bacon, Newman, Becket; on New Testament Greek (*Johannine Grammar*) and criticism, *Silanus the Christian*, and *The Fourfold Gospel* (1913 *et seq.*). He lived

most of his later life in complete retirement, and died 10th October 1926.

Abbott, JACOB (1803–79), born at Hallowell, Maine, was professor of Mathematics in Amherst College (1825–29), became a Congregational pastor, but devoted most of his life to educational work and literature. In 1838 he began writing simple and popular works, mainly for the young; the 'memorial edition' of the best known, *The Young Christian*, contained a life by his son. He published over two hundred volumes, largely didactic fiction and somewhat superficial history, amongst which are 'The Franconia Stories' (10 vols.), 'Histories for the Young' (19 vols.), 'Harper's Story Books' (36 vols.), 'The Rollo Books' (36 vols.), 'American Histories for Youth' (8 vols.).—LYMAN ABBOTT (1835–1922), his son, was born at Roxbury (now in Boston); studied law; but became a Congregational minister in New York and elsewhere, and was Ward Beecher's successor in Brooklyn (1888–99). He published a religious dictionary, a New Testament commentary, books on evolution and Christianity and on social problems, the life of Ward Beecher, *Reminiscences*, and (with his brother) novels. From 1893 he was editor-in-chief of *The Outlook*.—JOHN STEPHENS CABOT ABBOTT (1805–77), Jacob's brother, was born at Brunswick, Maine, studied at Bowdoin and Andover, and was minister in Worcester and Roxbury. He wrote histories of Napoleon Bonaparte (1855, readable, but extravagantly panegyrical), of the French Revolution, Marie Antoinette, Josephine, Napoleon III., the American Civil War, &c.

Abbottabad, a town and cantonment, 65 miles NNE. of Rawal Pindi, is headquarters of the Hazara district, North-west Frontier Province, and was named after Sir James Abbott (1807–96), who organised the country after annexation; pop. 11,500.

Abbreviations, contrivances in writing for saving time and space, in which the initial syllable, initial or other letters, or arbitrary signs are made to do duty for whole words and phrases. In ancient inscriptions, in Greek and Roman MSS., and in mediæval documents, such saving of space was extremely important, and abbreviation and contraction were carried so far that to decipher them special training is necessary; see PALÆOGRAPHY, INSCRIPTIONS. In the earliest times, when uncial or lapidary characters were in use, initials were often made to serve, like M for *Marcus*, F for *filius*. Signs of abbreviation, and characters representing double consonants, syllables, and words, became common after the invention of the small Greek and Roman letters. From the MSS. they passed into early printed texts, and only within the last century have they disappeared from Greek texts. The middle ages inherited many Roman contractions in inscriptions, books, and legal documents, and they survived into comparatively modern use. An act of George II. forbade abbreviations in legal documents. Here only abbreviations in current English use are given. The most obvious are omitted. See for chemical symbols, ATOMIC THEORY, CHEMISTRY.

A., amateur; (with letters following) assistant, associate. A.A., Automobile Association. A.A.A., Amateur Athletic Association. A.B., able-bodied seaman; *Artium Baccalaureus*, Bachelor of Arts. Abp., Archbishop. A.C., *Ante Christum* (*natum*), before (the birth of) Christ. Acct. *or* A/c, account. A.D., *anno Domini*, in the year of our Lord. A.D.C., Aide-de-camp. Ad lib., *ad libitum*, at pleasure. Æt., *ætatis* [*anno*], in the year of his age. A.F.A., Associate of the Faculty of Actuaries. A.G., Adjutant-general. A.H., *anno Hegiræ*, in the year of the Hegira (622 A.D.). A.I.A., Associate of the Institute of Actuaries. Ala., Alabama. Alta., Alberta. A.M., *ante meridiem*, before noon; *anno mundi*, in the year of the world; *Artium Magister*, Master of Arts. A.M.I.C.(E.)E., Associated Member of the Institute of Civil (Electrical) Engineers. A.O.D., Army Ordnance Department. A.P.D., Army Pay Department. A.P.S., Aborigines Protection Society. A.R.A., Associate of Royal Academy. A.R.H.A., Associate of the Royal Hibernian Academy. Ariz., Arizona. Ark., Arkansas. A.R.S.A., Associate of the Royal Scottish Academy. A.S., Anglo-Saxon. A.S.C., Army Service Corps. A.S.E., Amalgamated Society of Engineers. A.U.C., *ab urbe condita*, from the building of Rome (753 B.C.). A.V., Authorised Version of the Bible. A.V.D., Army Veterinary Department.

B—*b.*, born. B.A., *Baccalaureus Artium*, Bachelor of Arts. Bart. *or* Bt., Baronet. B.C., Before Christ. B.C.L., Bachelor of Civil Law. B.D., Bachelor of Divinity. B.E.A., British East Africa. B.L., Bachelor of Law or of Letters. *B/l.*, bill of lading. B.M., Bachelor of Medicine; British Museum. Bp., Bishop. B.Sc., Bachelor of Science. B.V.M., Blessed Virgin Mary. B.W.I., British West Indies.

C—*c.*, *ca.*, *circa*, about. C., *centum*, a hundred; centigrade; century. C.A., Chartered Accountant. Cal., California. Cantab., *Cantabrigiensis*, of Cambridge. Cantuar., *Cantuarensis*, of Canterbury. Cap., *capitulum*, chapter. C.B., Companion of the Bath. C.B.E., Commander of the British Empire. C.C., County Council. C.C.C., Corpus Christi College. C.D.V., carte-de-visite. C.E., Civil Engineer; Christian Endeavour. C.F., Chaplain to the Forces. Cf., *confer*, compare. C.F.G., *Confédération Générale du Travail*, General Confederation of Labour. C.H., Companion of Honour. C.G.S., centimetre-gramme-second. Ch.B., Bachelor of Surgery. Ch.M., Master of Surgery. C.I., Order of the Crown of India. C.I.D., Criminal Investigation Department. C.I.E., Companion of the Order of the Indian Empire. c.i.f., cost, insurance, freight. C.J., Chief-justice. C.M., certificated master; *Chirurgiæ Magister*, Master in Surgery. Cmd. Cd., Command Paper. C.M.G., Companion of the Order of St Michael and St George. C.M.S., Church Missionary Society. c/o, care of. Co., Company; county. C.O.D., cash (or collect) on delivery. Col., Colorado. Con., *contra*, against. Conn. *or* Ct., Connecticut. C.O.S., Charity Organisation Society. Cr., creditor. C.S.I., Companion of the Star of India. C.T., certificated teacher; commercial traveller. Curt., current—the present month. Cwt., hundredweight.

D—*d.*, *denarius*, a penny; *dele*, delete, erase. D.B.E., Dame Commander of the British Empire. D.C., *da capo*, from the beginning; District of Columbia. D.C.L., Doctor of Civil Law. D.C.M., Distinguished Conduct Medal; district court martial. D.D., Doctor of Divinity; *donum dedit*, as a gift. Del., Delaware. Delt., *delineavit*, drew (it). D.G., *Dei gratiâ*, by the grace of God. D.L., Deputy Lieutenant. D.Lit., Doctor of Literature. D.L.O., Dead-letter Office. D.N.B., Dictionary of National Biography. Do., *ditto* (Ital.), the said; the same. D.O.M., *Deo optimo maximo*, to God, best and greatest. D.P.H., Diploma in Public Health. Dr., Doctor; debtor. D.S., *dal segno*, from the sign. D.Sc., Doctor of Science. D.S.O., Distinguished Service Order; District Staff Officer. D.T., Doctor of Theology. D.V., *Deo volente*, God willing. Dwt., pennyweight.

Ebor., *Eboracensis*, of York. E.C., Established Church; East Central. E.C.U., English Church Union. Ed., edition; editor. E.E.T.S., Early English Text Society. *e.g. or* ex. gr., *exempli gratia*, for example. E.I., East Indies. et al., *et alii*, and others. Etc., *et cætera*, and the rest; and so on. Et seq., *et sequentia*, and the following. Exr., executor.

F—*f.*, following. F., Fahr., Fahrenheit. F.B.A., Fellow of the British Academy. F.B.S., Fellow of Botanical Society. F.C.P., Fellow of College of Preceptors. Fcp., foolscap. F.C.S., Fellow of the Chemical Society. F.D., *Fidei Defensor*, Defender of the Faith. Fec., *fecit*, made (it). F.E.I.S., Fellow of the Educational Institute of Scotland. *ff.*, following (plur.). F.F.A., Fellow of the Faculty of Actuaries. F.F.P.S., Fellow of the Faculty of Physicians and Surgeons (Glasgow). F.G.S., Fellow of Geological Society. F.H.A.S., Fellow of the Highland and Agricultural Society. F.I.A., Fellow of the Institute of Actuaries. F.I.C., Fellow of the Institute of Chemistry. F.K.Q.C.P.I., Fellow of the King's and Queen's College of Physicians in Ireland. Fl., *floruit*, flourished. Fla., Florida. F.L.S., Fellow of the Linnæan Society. F.M., Field-marshal. F.O., Field-officer. F.O.B., free on board. F.P., fire-plug. F.P.S., Fellow of Philological Society. F.R.A.S., Fellow of the Royal Astronomical, or Asiatic Society. F.R.C.I., Fellow of Royal Colonial Institute. F.R.C.O., Fellow of the Royal College of Organists. F.R.C.P., Fellow of the Royal College of Physicians. F.R.C.S., Fellow of Royal College of Surgeons. F.R.C.S.E., Fellow of Royal College of Surgeons of Edinburgh. F.R.G.S., Fellow of the Royal Geographical Society. F.R.Hist.S., Fellow of Royal Historical Society. F.R.H(ort).S., Fellow of Royal Horticultural Society. F.R.I.B.A., Fellow of the Royal Institute of British Architects. F.R.Met.S., Fellow of Royal Meteorological Society. F.R.S., Fellow of the Royal Society. F.R.S.E., Fellow of the Royal Society of Edinburgh. F.R.S.L., Fellow of the Royal Society of Literature. F.S.A., Fellow of the Society of Antiquaries. F.S.I., Fellow of Surveyors' Institution. F.S.S., Fellow of Statistical Society. F.Z.S., Fellow of Zoological Society.

Ga. *or* Geo., Georgia. G.B., Great Britain. G.B.E., Knight or Dame Grand Cross of the British Empire. G.C.B., Grand Cross of the Bath. G.C.L.H., Grand Cross of the Legion of Honour. G.C.M., greatest common measure; general court-martial. G.C.M.G., Grand Cross of St Michael and St George. G.C.S.I., Grand Cross of the Star of India. G.C.V.O., Grand Commander of the Victorian Order. G.F.S., Girls' Friendly Society. G.H.Q., General Headquarters. Gk. *or* Gr., Greek. G.M.T., Greenwich mean time. G.P., general practitioner;

general paralysis. G.P.O., General Post-office. G.R.I., Georgius Rex Imperator. G.W.R., Great Western Railway.

H., Hydrant. H.B.M., His or Her Britannic Majesty. H.C.F., highest common factor. H.E., His Excellency (or Eminence). H.E.I.C.S., Honourable East India Company's Service. H.G., Horse Guards. H.I.H., His or Her Imperial Highness. H.L.I., Highland Light Infantry. H.M.A.S., His Majesty's Australian ship. H.M.C.S., His Majesty's Canadian ship. H.M.S., His or Her Majesty's service, or ship. H.P., horse-power. H.R., House of Representatives. H.R.H., His or Her Royal Highness. H.S.H., His or Her Serene Highness.

I., *imperator*, *imperatrix*, emperor or empress. Ia., Iowa. Ib. *or* ibid., *ibidem*, in the same place. I.C.S., Indian Civil Service. Id., *idem*, the same. I.D.B., illicit diamond buyer. *i.e.*, *id est*, that is. I.H.P., indicated horse-power. I.H.S., for the Greek capitals IHΣ, the first three letters of ΙΗΣΟΥΣ, Jesus; erroneously supposed to be *Iesus hominum Salvator*, Jesus the Saviour of men. Ill., Illinois. I.L.P., Independent Labour Party. Imp., *Imperator*, emperor; imperial. I.M.S., Indian Medical Service. Incog., *incognito* (Ital.), unknown. Ind., Indiana. Inf., *infra*, below. I.N.R.I., *Iesus Nazarenus Rex Iudæorum*, Jesus of Nazareth, King of the Jews. Inst., *instante* (*mense*), instant, of the present month; institute. Inv., *invenit*, designed (it). I.O.G.T., Independent Order of Good Templars. I.O.M., Isle of Man. I.O.O.F., Independent Order of Oddfellows. I.O.U., I owe you. I.O.W., Isle of Wight. I.P.D., *in præsentia Dominorum*, in presence of the Lords (of Session), Edinburgh. It., Italian. I.W.W., Industrial Workers of the World. I.Y., Imperial Yeomanry.

J.C., *juris consultus*, jurisconsult. J.C.D., *Juris Civilis Doctor*, Doctor of Civil Law. Jno., John. J.P., Justice of the Peace. Jr., junior. J.U.D., *Juris Utriusque Doctor*, Doctor both of Civil and of Canon Law.

Kan., Kansas. K.B., Knight of the Bath. K.B.E., Knight Commander of the British Empire. K.C., King's Counsel. K.C.B., Knight Commander of the Bath. K.C.H., Knight Commander of the Order of Hanover. K.C.M.G., Knight Commander of St Michael and St George. Ken. *or* Ky., Kentucky. K.G., Knight of the Garter. K.G.F., Knight of the Golden Fleece. K.H., Knight of Hanover. kilo., kilogramme. K.L.H., Knight of Legion of Honour. K.M., Knight of Malta. Knt. *or* Kt., knight. K.P., Knight of St Patrick. K.T., Knight of the Thistle.

L *or* £, *libra*, pound sterling; £E, pounds Egyptian; £T, pounds Turkish. L.A., law agent; Literate in Arts. Lat., Latin; latitude. lb., *libra*, pound. l.c., lowercase; *loco citato* (*loc. cit.*), in the passage quoted. L.C.C., London County Council. L.C.M., least common multiple. L.D.S., Licentiate in Dental Surgery. L.H.D. *or* Litt.D., *Literarum Humaniorum Doctor*, Doctor of Letters. L.I., Long Island; Light Infantry. Linn., Linnæan, Linnæus. LL.B., *Legum Baccalaureus*, Bachelor of Laws. LL.D., *Legum Doctor*, Doctor of Laws. L.M.S., London Midland and Scottish Railway. L.N.E.R., London and North Eastern Railway. long., longitude. Loq., *loquitur*, speaks. Lou. *or* La., Louisiana. L.P. *or* l.p., large paper. L.R.C.P.(E.), Licentiate of the Royal College of Physicians (of Edinburgh). L.R.C.S., Licentiate of the Royal College of Surgeons. L.S., *locus sigilli*, the place of the seal. L.S.A., Licentiate of the Society of Apothecaries. L.S.D., *libræ*, *solidi*, *denarii*, pounds, shillings, pence. LXX., Septuagint.

M., *mille*, a thousand; monsieur; *meridies*, noon. M.A., *Magister Artium*, Master of Arts. Mass., Massachusetts. M.B., Bachelor of Medicine. M.B.E., Member of Order of the British Empire. M.C., Member of Congress; Master of Ceremonies. M.C.C., Marylebone Cricket Club. M.D., *Medicinæ Doctor*, Doctor of Medicine. Md., Maryland. Mdlle. *or* Mlle., mademoiselle. Me., Maine. M.E., Middle English; Mining or Mechanical Engineer. Mem., *memento*, remember. M.F.H., Master of Fox-hounds. Mich., Michigan. M.I.Mech.E., Member of Institute of Mechanical Engineers. Minn., Minnesota. M.Inst.C.E., Member of the Institution of Civil Engineers. Miss., Mississippi. M.L.A., M.L.C., Member of Legislative Assembly, Council. MM., messieurs. Mme., madame. Mo., Missouri. Mont., Montana. M.O.H., Medical Officer of Health. M.P., Member of Parliament. M.P.S., Member of the Philological (or Pharmaceutical) Society. M.R.C.P., Member of the Royal College of Physicians. M.R.C.(V.)S., Member of the Royal College of (Veterinary) Surgeons. M.R.I.A., Member of Royal Irish Academy. MS. (plur. MSS.), manuscript. M.S., Master of Surgery. Mus.Bac., Bachelor of Music. Mus.Doc., Doctor of Music.

N.A., North America. N.B., North Britain; New Brunswick; *nota bene*, mark well, observe. N.C., North Carolina. N.C.O., non-commissioned officer. N.D. *or* n.d., no date. N.D., North Dakota. N.E., New England. Neb., Nebraska. N.E.D., New English Dictionary. Nem. con., *nemine contradicente*, no one contradicting. Nev., Nevada. N.F., Newfoundland. N.H., New Hampshire. N.J., New Jersey. N.M., New Mexico. N.O., New Orleans. No., *numero*, number. N.P., Notary Public; New Providence; no place (on title-pages). N.R.A., National Rifle Association. N.S., New Style; Nova Scotia. N.S.P.C.C., National Society for the Prevention of Cruelty to Children. N.S.W., New South Wales. N.T., New Testament. N.U.R., National Union of Railwaymen. N.W.T., North-west Territories. N.Y., New York. N.Z., New Zealand. N. & Q., Notes and Queries.

O., Ohio. $^{o}/_{o}$, on account of. Ob., *obiit*, died. O.B.E., Officer of Order of the British Empire. Obs., obsolete. O.C., Officer Commanding. O.D., ordinary seaman; ordnance data. O.E., Old English. O.F.S., Orange Free State. O.H.G., Old High German. O.K., *for* all correct. Okla., Oklahoma. O.M., Order of Merit. Ont., Ontario. O.P., out of print; Order of Preachers (Dominicans); opposite prompter. Op. cit., *opere citato*, in the work quoted. Ore., Oregon. O.S., Old Style. O.S.B., Order of St Benedict. O.S.F., Order of St Francis. o.s.p., *obiit sine prole*, died without issue. O.T., Old Testament. O.T.C., Officers' Training Corps. Oxon., *Oxoniensis*, of Oxford.

P., president; prince. Pa., Pennsylvania. P.A., Press Association. P.C., Privy Councillor; police constable. p.c., *per centum*, by the hundred; post-card. P.E.I., Prince Edward Island. Penn., Pennsylvania. P.G.M., Past Grand-master Mason. Ph.D., *Philosophiæ Doctor*, Doctor of Philosophy. Phila., Philadelphia. P.I., Philippine Islands. Pinx., *pinxit*, painted (it). P.L., Poet Laureate. P.M., *post meridiem*, after noon; Past Master; *post mortem*, after death. P.M.G., Postmaster-general. P.O., post-office; postal order. P. & O., Peninsular and Oriental Company. P.O.O., post-office order. pp., pages. P.P., parish priest. P.P.C., *pour prendre congé*, to take leave. P.Q., Province of Quebec. P.R., prize-ring; Porto Rico; proportional representation. Pro., professional. Pro. tem., *pro tempore*, for the time. Prox., *proximo*, in the next month. P.S., *post scriptum*, postscript; paddle-steamer. Pte., private soldier. P.T.O., please turn over. P.W.D., Public Works Department.

Q., query or question. Q.C., Queen's Counsel. Q.E.D., *quod erat demonstrandum*, which was to be demonstrated. Q.E.F., *quod erat faciendum*, which was to be done. Q.M.G., Quarter-master-general. *q.s.*, *quantum sufficit*, enough. Q.S., Quarter Sessions. *q.v.*, *quod vide*, which see.

R., Réaumur; *Rex* or *Regina*, King or Queen. R., *or* ℞, *recipe* (in prescriptions), take. R.A., Royal Academician; Royal Artillery. R.A.F., Royal Air Force. R.A.M., Royal Academy of Music. R.A.M.C., Royal Army Medical Corps. R.B., Rifle Brigade. R.B.A., Royal Society of British Artists. R.C., Roman Catholic. R.C.P., Royal College of Preceptors. R.E., Royal Engineers. R.F.A., Royal Field Artillery. R.G.A., Royal Garrison Artillery. R.H.A., Royal Horse Artillery. R.H.G., Royal Horse Guards. R.I., Rhode Island. R.I.C., Royal Irish Constabulary. R.I.P., *requiescat in pace*, may he rest in peace. R.M., Royal Marines; Royal Mail; resident magistrate. R.M.A., Royal Marine Artillery; Royal Military Asylum. R.M.L.I., Royal Marine Light Infantry. R.M.S., Royal Mail Steamer; Royal Microscopical (or Meteorological) Society. R.N., Royal Navy. R.N.R., Royal Naval Reserve. Rs., Rupees. R.S.A., Royal Scottish Academician. R.S.M., Royal School of Mines. R.S.O., Railway Sub-office. R.S.P.C.A., Royal Society for the Prevention of Cruelty to Animals. R.S.V.P., *répondez s'il vous plaît*, please reply. R.S.W., Royal Scottish Watercolour Society. R.V., Revised Version.

S., saint; seconds; south. SS., saints. S.A., South Africa; South Australia. S.Am., South America. Sc., *scilicet*, namely; *sculpsit*, engraved (it). S.C., South Carolina. Sc.D., Doctor of Science. S.D., South Dakota. S.D.F., Social Democratic Federation. Sen., senator; senior. S.J., Society of Jesus (Order of the Jesuits). S.L., Solicitor at Law; *sine loco* (without place, on title-pages). S.L.P., Socialist Labour Party. S.M., *Sa Majesté*, His or Her Majesty. S.P. *or* s.p., *sine prole*, without offspring. S.P.C.K., Society for Promoting Christian Knowledge. S.P.G., Society for the Propagation of the Gospel. S.P.Q.R., *senatus populusque Romanus*, the Roman senate and people. S.P.R., Society for Psychical Research. Sq., *sequens*, the following. Sqq., *sequentia*, the following (plur.). S.S., screw-steamer. S.S.C., Solicitor before the Supreme Courts (Scotland). S.T.P., *Sacræ Theologiæ Professor*, Professor of Theology (or S.S.T.P., *Sanctissimæ*). Sup., *supra*, above. *s.v.*, *sub voce*, under such and such a head.

T.B.D., torpedo-boat destroyer. T.C.D., Trinity College, Dublin. Tenn., Tennessee. Tex., Texas. T.F., Territorial Force. T.N.T., trinitrotoluene. T.O., telegraph-office; turn over. tr., transpose.

U.D.C., Urban District Council. U.F.C., United Free Church. U.K., United Kingdom. Ult., *ultimo* (*mense*), in the last month. U.P., United Presbyterian. U.S., United States; United Service. U.S.A., United States of America; United States Army. U.S.N., United States Navy. U.S.S., United States ship. U., Utah. ut sup., *ut supra*, as above.

V., *versus*, against. V.A., Order of Victoria and Albert. Va., Virginia. V.C., Victoria Cross; vice-chancellor; vice-consul. V.D., Volunteer decoration. V.D.M., *Verbi Dei minister*, preacher of the Word of God. V.G., vicar-general. viz., *videlicet*, to wit; namely. V.P., vice-president. V.R.(I.), *Victoria Regina* (*Imperatrix*), Victoria, Queen (and Empress). V.S., veterinary surgeon; *volti subito*, turn quickly. Vt., Vermont.

W.A., Western Australia. Wash., Washington. W.E.A., Workers' Educational Association. W.I., West Indies. Wis., Wisconsin. W.O., War Office. W.S., Writer to the Signet. W.S.P.U., Women's Social and Political Union. W.Va., West Virginia. Wyo., Wyoming.

Xmas., Christmas. (The Greek letter X=Ch). XPI. (=Chri.), *Christos*, Christ. Xtian., Christian.

Ye, Yt, the, that (see article on letter T). Y.M.C.A., Young Men's Christian Association. Yr., younger. Y.W.C.A., Young Women's Christian Association.

&, &c.=*et*, and. &c., *et cætera*, and the rest. $, dollar.

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Abd-el-Kader ('servant of God'), properly Sidi-el-Hadji-Abd-el-Kader-Uled-Mahiddin, the famous hero in the great Algerian struggle with the French, was born at Mascara in 1807. A scion of a priestly house that traced its pedigree to the khalifs of the lineage of Fatima, he was carefully educated, and early succeeded to the high influence held by his father among his countrymen. His public career began at the time of the conquest of Algiers by the French. No sooner was the power of the Turks broken than the Arab tribes of the province of Oran elected him as their emir. He thus found himself the leader of the combined tribes in their attempt to check the growing power of France in Northern Africa, and began that long struggle with the French, which he waged with such marvellous perseverance and strategic skill, from 1832 to 1847. Often defeated, he appeared soon after at the head of new troops, and baffled the enemy by his marvellous rapidity. In 1834 he compelled General Desmichels to recognise his authority in a treaty, and meantime his influence spread widely among the tribes of the interior. Hostilities soon broke out again, and in June (1835) he inflicted a severe defeat on a large French army at Makta. Spite, however, of his heroism, he was crushed by overpowering force, and compelled, after a protracted struggle, to take refuge in Morocco. Here he succeeded in getting up a sort of crusade against the enemies of Islam; but Bugeaud's decisive victory at Isly in 1844 obliged the sultan of Morocco to give up the cause of Abd-el-Kader, though he could not prevent his warlike subjects from giving sympathy and some support to the brave champion of their faith. His own security soon obliged the sultan to oppose him actively, and at length Abd-el-Kader was forced, after a daring but unsuccessful attack on the Moorish camp, to retreat into the territory of Algeria, where he had to surrender to General Lamoricière, December 22, 1847. He was sent with his family to France, where he lived in honourable captivity, until liberated in 1852 by Louis Napoleon. He afterwards resided successively at Brussa in Asia Minor, at Constantinople, and finally at Damascus. Enjoying a French pension of 100,000 francs, he spent his leisure in writing a religious and philosophical work, translated in 1858 under the title *Rappel à l'Intelligent: Avis à l'Indifférent.* He was of great service to the cause of humanity during the Syrian massacres of 1860, and for this was decorated by Napoleon III. with the Grand Cross of the Legion of Honour. In 1865 he visited Paris and England, and he was present at the Paris Exhibition in 1867. He died at Damascus, 26th May 1883.

The Life of Abd-el-Kader, by C. A. Churchill (1867), said to be 'written from his own dictation, and compiled from other authentic sources,' savours somewhat too much of panegyric. There are also several French lives — such, for example, as that of Laménaire (1848), that of Bellemare (1863), and that of Pichon (1899).

Abde'ra, a town which stood on the south coast of ancient Thracia, to the east of the river Nestus. Colonised by the inhabitants of Teos in 541 B.C., it afterwards came under the power of Athens, and was a free town under the Romans. Although the birthplace of such distinguished men as the philosophers Democritus, Protagoras, Anaxarchus, and the historian Hecatæus, Abdera was the Gotham of antiquity, and 'Abderite' was a proverbial name for a simpleton.

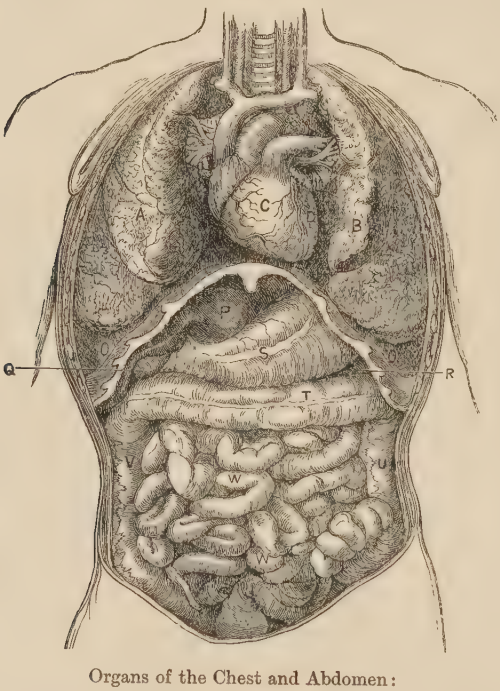
Abd-er-Rahman, or ABD-AL-RAHMAN KHAN, Amir of Afghanistan, was the grandson of Dost Mohammed (see AFGHANISTAN), and after his grandfather's death (1863) for a time supported successfully the claims of his father, Afzul, against his uncle, Shere Ali. When after 1868 Shere Ali was triumphant over all rivals, Abd-er-Rahman took refuge in Russian Turkestan, and became practically a Russian pensioner; till, on the death of Shere Ali, he succeeded in overthrowing his son, Yakub Khan, and from 1880 was fully recognised as Amir. Contrary to expectation, he was in no wise pro-Russian, but eminently friendly to Britain, like his grandfather. He showed masterly skill and energy in consolidating his power, extending his frontiers amongst the hill-tribes, still more savage than his own Afghans, and in promoting such European arts and manufactures (notably rifles) as seemed likely to conduce to his own well-being and the security of the state. His additional territory was secured to him by treaties with Britain, and he was made K.C.B. and G.C.S.I. A life of him was written by Mr Stephen Wheeler in 1895; and Mr J. A. Gray, who was surgeon and painter-in-ordinary to the Amîr (and official taster of spirits distilled in the country), wrote a vivacious account of life *At the Court of the Amîr* (1895; new ed. 1901). At his death in 1901 he was succeeded by his son, Habibulla Khan. See also ABD-UR-RAHMAN.

Abdication, the resignation of an office by a ruler or sovereign, is rarely due to preference for a private station, is generally the result of vexation and disappointment, but is sometimes caused by a father's wish to relieve his son and his dynasty from the unpopularity of his own failures. It was from being wearied with dominion that Diocletian abdicated (305 A.D.). Christina of Sweden retired from the throne (1654) out of preference for the freedom of private life, but wished still to exercise the rights of a sovereign. Charles V. laid down the crown (1556) chiefly from ill-health, but partly, too, because his great schemes had failed. Philip V. of Spain did so (1724) in a fit of melancholy, but resumed it on the death of his son. Louis Bonaparte resigned the crown of Holland (1810) because he would not consent to treat that country as a province of France. Charles-Emmanuel of Sardinia retired from the throne in 1802, not finding himself equal to the crisis; and the same was the case with Victor-Emmanuel in 1821. William I. of the Netherlands resigned (1840) as his policy had become impossible from the turn of affairs in Belgium. Foreign force compelled the abdication of Augustus of Poland (1704), and later, that of Stanislaus Leszczynski (1735) and of Poniatowski (1795); as well as that of Charles IV. of Spain (1808), and of Napoleon (1814 and 1815). Insurrections have been a frequent cause of abdications. In England we have the compulsory abdication of Richard II. (1399); in Scotland that of Mary at Lochleven (1567); and the early history of the Scandinavian kingdoms furnishes many instances. Modern times have seen Charles X. (1830) and Louis-Philippe (1848) retire before the storm of revolution, without the conditions they made being regarded; have seen, too, the abdication of Ferdinand of Austria (1848), of Louis of Bavaria (1848), of Amadeus of Spain (1873), of Prince Alexander of Bulgaria (1886), of Manoel of Portugal (1910), of the Emperor of China (1912), of Constantine of Greece (1917; regained throne 1920, finally lost 1922), and of George II. of Greece (1924). The revolutions of 1917–18 brought about the abdication of the Russian, Austrian, and German emperors, and the abdication or deposition of the German federal princes, and of other sovereigns.

In some countries the king can abdicate whenever he pleases; but in England, the constitutional relation between the crown and the nation being of the nature of a contract, the king or queen, it is considered, cannot abdicate without the consent of parliament. It is, however, said that the king does abdicate, or, to speak perhaps more correctly,

an abdication may be presumed and acted on by the people, if his conduct politically and overtly is inconsistent with, and subversive of, the system of constitutional government, of which the qualified monarchy of his office forms part. Thus, in the case of James II., it was disputed whether the king had 'abdicated' or 'deserted.' At the conference between the two Houses of Parliament previous to the passing of the statute which settled the crown on William III., it would appear that the word 'abdicated' was advisedly used instead of 'deserted'—the meaning, it is presumed, being that James had not only deserted his office, but that by his acts and deeds, of which the said desertion formed part, he had, in view of the constitution, ceased to have right to the throne. From this it may be inferred that abdication was considered to have a twofold political signification, involving maladministration as well as desertion. The Scottish Convention, however, more vigorously and distinctly resolved that King James 'had forfeited the crown, and the throne was become vacant.'

Abdomen. The trunk of the human body is divided by the diaphragm into two cavities—the upper being the thorax or chest, and the lower, the abdomen or belly. Both the cavity and the viscera



Organs of the Chest and Abdomen:

A, B, lungs; C, heart; OO, diaphragm; P, liver; Q, gall-bladder; R, spleen; S, stomach; T U V, colon; W, W, small intestines.

it contains are included in the term abdomen. It is subdivided into two parts, the *abdomen proper*, and the *pelvis*, or basin. The former contains the liver, pancreas, spleen, and kidneys, as well as the stomach, small intestine, and large intestine or colon; the latter, the lowest part of the cavity, contains the lower bowel or rectum, the urinary bladder, and internal organs of generation. The abdomen is lined by a serous membrane, the peritoneum, which covers the free surfaces of the viscera, allowing them a certain range of movement, but keeping them in their proper relations to each other. For the purpose of making accurate reference to the position of the contained organs, the abdomen proper is artificially divided externally by two horizontal planes into three principal *zones*—the upper, the middle, and the lower. These are again subdivided by two vertical planes into nine areas—the three lateral divisions upon either side being named from above downwards, the hypochondriac, lumbar, and iliac regions respectively; while the names epigastric, umbilical, and hypogastric, are applied from above downwards to the three mesial areas. See the article DIGESTION; also LIVER, BLADDER, &c.—In entomology, the abdomen is the posterior of the three parts into which the body of an insect is divided. See INSECT.

Abduction is a term signifying the unlawful taking away of a person. In the law of Rome it was a crime, known as *plagium*, to carry away or secrete a free person, or to sell or buy him as a slave (Dig. 48. 15. 6. 2). In England *Kidnapping* (q.v.) includes the stealing and carrying away or secreting of any person of any sex or age against the will of such person. Its most aggravated form is the forcible taking away of a person from his own country to parts beyond the seas. In modern English law the term abduction is usually applied to the carrying away of women or girls, and various forms of such abduction are punishable. Thus the Offences against the Person Act, 1861, imposes heavy penalties on the abduction of heiresses. By the same statute the unlawful taking of an unmarried girl under the age of sixteen years out of the possession, and against the will, of her father or mother, or of any other person having the lawful care or charge of her, may be punished by two years' imprisonment. Under the Criminal Law Amendment Acts, 1885 and 1912—applicable to both England and Scotland—such taking of a girl under eighteen with intent to have carnal knowledge of her, meets with the same punishment; but it is a defence that the person charged had reasonable cause to believe that the girl was not under the age of eighteen. The procuration or attempted procuration of a girl under twenty-one for the purpose of unlawful connection, and the procuration or attempted procuration of any woman or girl, of any age, to become a prostitute, are offences punishable with two years' imprisonment. A male person convicted of such procuration may, in addition to imprisonment, be sentenced to be once privately whipped, the number of strokes and the instrument of whipping being specified in the sentence of the court. The Mental Deficiency Act, 1913, contains provisions for the protection of female 'defectives.' The abduction of children under fourteen is technically known in England as child-stealing, and is punishable by penal servitude. The mother of a child, or the father of a bastard, is in no case chargeable with the offence. In Scotland the term abduction is used in a general sense, which includes the unlawful carrying away not only of women and children but also of witnesses in judicial proceedings, municipal or parliamentary voters, or indeed any person whatsoever. In Scots law *plagium* is the theft of a child under puberty, and it is a crime to detain and secrete such a child known to have been stolen.

In the United States abduction is the taking and carrying away of a child, a ward, a wife, &c., by fraud, persuasion, or open violence. In many of the states there are statutes directed against the taking and detaining of any woman against her will with intent to have carnal knowledge of her or that another shall have such knowledge, and against the taking away or enticing of a girl, under a designated age, for the purpose of prostitution or sexual intercourse.

Abdul-Aziz, the thirty-second sultan of the Ottoman Turks, was born 9th February 1830, the younger son of Sultan Mahmud II. (see TURKEY),

and succeeded his brother, Abdul-Mejîd, in 1861. At first he showed himself liberal-minded and open to Western ideas; but the promise of economy and reform was illusory, and ere long the sultan began to spend vast sums on his army, the embellishment of his capital, on hunting, and on costly journeys. Spite of this, reforms were long hoped for, especially after his visit to western Europe in 1867. His government had great difficulties to contend with in the Cretan insurrection, the struggle of Rumania and Serbia for full autonomy, and Russian intrigues; and he plunged ever into deeper financial difficulties, while stupid misgovernment led, in 1875, to risings in Bosnia, Herzegovina, and Bulgaria. A conspiracy forced him to abdicate the throne, 30th May 1876; and four days later he was found dead.

Abdul-Azîz ibn Sa'ud, king of Nejd and the Hejaz. See WAHHÂBIS.

Abdul Bahâ, SIR, or ABBAS EFENDI (1844–1921), son of Bahâ'Ullâh, and his successor as leader of the Bahai religious movement. See BÂBÎ.

Abdul-Hamîd I., sultan of Turkey in 1773–1789; see TURKEY.—ABDUL-HAMÎD II., second son of Sultan Abdul-Mejîd, born 22d September 1842, succeeded in 1876, on the deposition of his brother, Murad V. The chief events of his reign were the unsuccessful war with Russia (1877–78); the Armenian atrocities (1894–96), which earned him the title of the 'Great Assassin;' the rising in Crete (1895–96); the successful war with Greece (1897); and troubles and reforms in Macedonia (1902–3). Deposed in 1909, he was succeeded by his younger brother, Mohammed V., and died 10th February 1918. See Life by Sir Edwin Pears (1917), and the article TURKEY.

Abdul-Latîf (1162–1231), a great Arabian writer was born at Baghdad and educated mainly at Damascus, and having settled in Egypt for some years, taught medicine and philosophy at Cairo; he afterwards lectured at Damascus. His numerous works were mainly on medicine; but his best-known book is a valuable descriptive work on *Egypt*, translated into Latin by White (Oxford, 1800), and into French by De Sacy (1810).

Abdul-Mejîd, the Grand Sultan, was born 23d April 1823, and succeeded his father, Mahmud II., in 1839. The Turkish empire was then in a very dangerous position. Its army had been defeated and dispersed by the Egyptians in the battle of Nisib, and there was nothing to hinder the victorious Ibrahim Pasha from advancing on Constantinople, where a large party were favourable to the Egyptian power under Mehemet Ali. Had it not been for the intervention of the Christian powers, the house of Othman was lost. The treaty of 1840, from which France kept aloof, obliged Mehemet Ali to submit; and the treaty of 1841, to which France subsequently adhered, settled securely the future dependent relation of Egypt to Turkey. The sultan, on the advice of Reshid Pasha, proceeded in the path of reform begun by his father, and by the famous *hatti-sherif* of November 3, 1839, promised equal protection to all his subjects irrespective of their creed. Numerous reforms followed, but many of his decrees had but little effect, as the sultan lacked energy both of body and mind. He acted a chivalrous part in 1850 in refusing, at the risk of losing his throne, to give up Kossuth and the other political refugees to the menaces of Russia and Austria, and he had a specially difficult part to play during the war with Russia (1854–56), the diplomatic negotiations, and the Hatti-Humâyûn (see STRATFORD DE REDCLIFFE). From this time the sultan sunk into unworthy indolence, and allowed public affairs to drift into financial ruin. He died 25th June 1861.

Abd-ur-Rahman, sultan of Fez and Morocco, born 1778, succeeded his uncle in 1823. His first four years of rule were occupied in quelling insurrections. Next, some danger to the state of Morocco was threatened by the refusal of Austria to pay the tribute for safety against pirates; but the sultan wisely adjusted the dispute by relinquishing this sort of blackmail, formerly levied by Morocco on European ships in the Mediterranean. The religious war under Abd-el-Kader against the French in Algeria involved the sultan in its movements. The piratical habits of his subjects brought him to the brink of war with more than one European state. He died in 1859.—The same name, also spelt Abd-al-Rahman and Abderrahman, is the name of the leader of the Saracens defeated at Tours in 732 by Charles Martel (q.v.), and of the first Ommiad khalif of Córdoba (755–788). See KHALIF, SPAIN; also ABD-ER-RAHMAN, AFGHANISTAN.

Abecedarians, a small sect among the Anabaptists in Germany in the 16th century, noted for their dislike to learning. They thought it best not even to learn to read, as a knowledge of the Scriptures was all that was necessary, and this was communicated by the Holy Spirit direct to the believer without the medium of the written word.

À Becket, THOMAS. See BECKET.

À Beckett, GILBERT ABBOTT (1811–56), born in London and educated at Westminster, was called to the bar in 1841, and in 1849 became a metropolitan police-magistrate. Besides writing for *Punch*, the *Times*, and many serials, he was author of *The Quizziology of the British Drama*, and is specially remembered as the inventor of the 'comic' *Blackstone* and the 'comic' Histories of England and Rome—the first illustrated by Cruikshank, the last two by Leech.—One son, Gilbert (1837–91), was a playwright; another, Sir Albert (1840–1904), was accountant-general in the War Office; a third, Arthur William (1844–1909), was successively or contemporaneously playwright, novelist, barrister, journalist, and editor.

Abel, second son of Adam, slain by his elder brother Cain; see ADAM, CAIN. The Christian Church has, in all ages, regarded Abel as a type of innocence and faith; and the Bible record was supplemented by the Rabbins and by the Koran.

Abel, SIR FREDERICK AUGUSTUS, chemist, was born in London in 1827. He chiefly devoted himself to the science of explosives, expounding his discoveries and investigations in *Gun-cotton* (1866), *The Modern History of Gunpowder*, *On Explosive Agents*, *Researches in Explosives*, and *Electricity applied to Explosive Purposes* (1884). He further wrote, in conjunction with Colonel Bloxam, a *Handbook of Chemistry*. He held important posts as chemist to the War Department and Ordnance Committees, and was made a baronet in 1893. Appointed secretary to the Imperial Institute in 1887, he was president of the British Association in 1890. He died 6th September 1902.—See also the articles GUN-COTTON and GUNPOWDER.

Abel, KARL FRIEDRICH, a German musician, born at Koethen in 1725. He was a pupil of Sebastian Bach, and in 1758 he came to England, where ere long he was appointed chamber-musician to the queen of George III. A composer for piano and strings (himself last of the great players on the viol-da-gamba), he died in London, 22d January 1787.

Abel, NIELS HENRIK, one of the ablest and acutest mathematicians of modern times, was born at Findö, Christiansand, 5th August 1802. He became a lecturer at the university of Christiania, and the school of engineering there. His works deal mainly with the theory of elliptical functions,

which his discoveries greatly enriched. He died 6th April 1829. See Life by Bjerknes (Fr. trans. 1885).

Ab'elard (Fr. *Abélard* or *Abailard;* Lat. *Abœlardus*), PETER, the keenest thinker and boldest theologian of the 12th century, was born at Pallet or Palais, near Nantes, in 1079. Resigning his prospects as eldest son of a noble Breton house, he chose the career of a scholar. During the wanderings of his studenthood, he heard Roscellin, the champion of extreme Nominalism (q.v.), and was a pupil of William of Champeaux, one of the foremost of the Realist teachers. His singular gifts as a dialectician soon enabled him to encounter his master in debate, and he speedily met with brilliant success as a scholastic lecturer. After conducting schools at Melun and Corbeil, he proceeded (1108) to Paris, and about 1115 he became William's successor in the school of Notre-Dame; and for a few years he enjoyed a repute and influence such as few teachers have ever had. But Abelard's fall from prosperity and power was sudden and rapid. Within the precincts of Notre-Dame lived Héloïse, the niece of the canon Fulbert, then seventeen years of age, and already remarkable for her beauty and accomplishments. She soon kindled in the breast of Abelard, then thirty-eight years old, an overwhelming passion, which was returned by Héloïse with no less fervour. By the uncle's choice, Abelard became Héloïse's tutor and an inmate of the same house, and the lovers were happy together until Abelard's glowing love songs reached the ears of the canon. He sought to separate the lovers; but it was too late. They fled together to Brittany, where Héloïse bore a son, and was privately married to Abelard with the consent of her uncle. Not long after, Héloïse returned to Fulbert's house, and with singular self-devotion denied the marriage, that her love might be no hindrance to Abelard's advancement in the church. When shortly after Héloïse fled to the convent of Argenteuil, Fulbert, enraged at her husband's connivance, caused him to be brutally mutilated, so that he might be made canonically incapable of ecclesiastical preferment. In deep humiliation, Abelard entered the abbey of St Denis as monk; Héloïse took the veil at Argenteuil. Ere long a synod at Soissons (1121) condemned his teaching on the Trinity as heretical, and ordered him to be confined for a time.

In the hermit's hut at Nogent-sur-Seine, to which he retired, Abelard was soon again besieged by importunate disciples; the hermitage became a monastic school known as Le Paraclet, which, when Abelard was invited to become abbot of St Gildas-de-Rhuys in Brittany, was given to Héloïse and a sisterhood under her care. In his abbey Abelard maintained for ten years a struggle with disorderly and unfriendly monks, and at last fled from the hopeless task. Freed from his charge by the pope, he now devoted himself to the revision of all his works. When he ventured again to appear in public as a teacher, his theological adversaries, headed by Bernard of Clairvaux (q.v.), accused him of numerous heresies, of which he was found guilty by a council at Sens and by the pope. He set out for Rome to defend himself, but weakness allowed him to get no farther than the abbey of Cluny. He died, reconciled ere death to his opponents, and absolved by the pope, at the priory of St Marcel, near Chalon, 21st April 1142. His remains were given into the keeping of Héloïse, whose own were twenty years afterwards laid beside them. From Le Paraclet, the ashes of both were taken to Paris in 1800, and in 1817 were buried in one sepulchre at Père la Chaise, where still they lie.—Abelard did more than any other to develop and fix that method of joint philosophising and theologising which was characteristic of the great scholastics (see SCHOLASTICISM); it was Abelard who made Aristotle the almost exclusive basis of theological dialectics. In the question of the universals (see NOMINALISM), he took a place between the extreme Nominalists and the thoroughgoing Realists. In opposition not merely to the unreasoning devotion of Bernard and the mystics, but as against the systematic dogmatism of Anselm, he taught that only that faith is well assured which is founded on reason. 'Understand that thou mayest believe' was his motto, not 'Believe that thou mayest understand.' His ethical system he set down in the work *Nosce teipsum. Sic et Non* is a curious collection of direct contradictions on important points gathered from the Fathers. Amongst his pupils were not a few of the greatest men of the age: Pope Celestine II., Peter Lombard, Berengar, John of Salisbury, and Arnold of Brescia.

See his own *Historia Calamitatum;* also monographs by Rémusat (Paris, 1845), Carriere (Giessen, 1853), Wilkens (Göttingen, 1855), Sauerland (Frankf. 1879), Deutsch (Leip. 1883), and Compayré (trans. 1893). The story of his life forms the subject of a remarkable drama by Rémusat; and the correspondence between Abelard and Héloïse (trans. C. K. Scott Moncrieff, 1925) suggested to Pope his *Epistle of Eloisa to Abelard.* See Abelard's works, ed. Cousin (2 vols. 1849–59); and *Peter Abelard,* by Joseph McCabe (1901).

Abele. See POPLAR.

Abelmoschus. See HIBISCUS.

Abencerra'ges, a noble Moorish family which came to Spain in the 8th century, and were named from Jusuf ben Serragh. Their struggles with the family of the Zegris, and tragical destruction in the Alhambra, in Granada, in the time of Abu Hassan (1466–84), the last but one of the kings of Granada, furnish the materials for the legend, probably unhistorical, found in Perez de Hita's *Historia de las Guerras Civiles de Granada* (1694). On this Chateaubriand based his romance, *Les Aventures du dernier des Abencerrages,* which furnished Cherubini with the text of an opera.

Aben-Ezra, properly Abraham-Ben-Meir-Ben-Esra (1093–1167), born at Toledo, was one of the most learned Jews of his time, distinguished for his knowledge of philosophy, mathematics, astronomy, and medicine. He visited France, Egypt, and England, and passed the later years of his life in Rome; everywhere giving lectures on grammar, theology, and astronomy. He left treatises on astrology and some poems; but his most important works are his Commentaries on the Old Testament.

Aber is a Celtic word which enters into the composition of several names of places, chiefly in Wales and Scotland. It indicates the mouth or embouchure of a stream, either into the sea, or into another river—as Aberbrothock (Arbroath), at the mouth of the Brothock, in Forfarshire; Abergavenny, at the junction of the Usk and Gavenny, in Wales.

Aberavon, a seaport in Glamorgan, on the Avon, near its mouth in Swansea Bay, 32 miles W. of Cardiff, with great copper, iron, steel, and tinplate works. It has a good harbour and docks, and in 1921 became part of Port Talbot municipal borough. Pop. 15,000.

Abercarn, in Monmouthshire, 10 miles NW. of Newport, is a coal and iron mining centre, with tinplate and other manufactures; pop. 20,000.

Abercorn, a Linlithgowshire hamlet, near the Firth of Forth, and 3¾ miles W. of South Queensferry. Here stood the monastery of Aebbercurnig, or Eoricorn, which, founded about 675, was from 681 to 685 the seat of a bishopric, the earliest in Scotland. For the ducal title, see HAMILTON.

Abercrombie, JOHN (1780–1844), Scottish physician, was born at Aberdeen, a parish minister's son.

He studied and practised medicine in Edinburgh; and after the death (in 1821) of the celebrated Dr Gregory, was recognised as the first consulting physician in Scotland. He wrote on the pathology of the brain and on diseases of the stomach. But he is best known by his *Intellectual Powers* (1830) and *Moral Feelings* (1833).

Abercrombie, Lascelles, born 9th January 1881, was educated at Malvern and Manchester University, became professor of English at Leeds in 1922. Besides studies of Thomas Hardy, the epic, *Theory of Art* (1922), *The Theory of Poetry* (1924), *The Idea of Great Poetry* (1925), and *Romanticism* (1926), he published *Interludes and Poems* (1908), *Mary and the Bramble* (1910), *Deborah* (blank-verse drama, 1913), *Short Plays* (1922), and *Phœnix* (tragicomedy, 1923), which quickly established his name as a poet with metaphysical leanings.

Abercromby, Sir Ralph, was born at Menstrie, Clackmannanshire, 7th October 1734. Destined for the Scottish bar, he was educated at Rugby, and then from 1752 to 1755 studied law at Edinburgh and Leipzig. But having in 1756 obtained a cornetcy in the 3d Dragoon Guards, he two years later saw some active service in the Seven Years' War. From 1774 to 1780 he represented Clackmannanshire in parliament; and in 1780 raised a regiment in Ireland, the 103d, or King's Irish. In 1793 he accompanied the Duke of York to Holland. His conduct throughout that unfortunate campaign, especially during the disastrous retreat in the winter of 1794–5, won him the love and admiration of the whole army. On his return to England, he was made a Knight of the Bath, and was appointed to the chief command of the West Indies Expedition, which he conducted with distinguished success. In 1797 he was sent to command the forces in Ireland; but his enlightened and manly remonstrances against the policy of government towards that country occasioned his removal to a similar command in Scotland. In 1799 he was second in command to the Duke of York in the other unhappy expedition to Holland. On his return, he received the command of the expedition to the Mediterranean. The fleet anchored in Aboukir Bay on 2d March 1801; and before mid-day of the 8th, the British troops were in possession of the sand-hills which command the shore, having landed in the face of a storm of shot. On the morning of the 21st, Menou, the French commander, attempted to surprise the British camp. He found them ready, under arms. In the glorious action that ensued, Abercromby was struck by a musket-ball in the thigh; but not till the battle was won did he show any sign of pain. The ball could not be extracted; mortification ensued; and on the 28th he died on board the flag-ship. He was buried at Malta, and a monument was erected to him in St Paul's. The peerage conferred on his widow was afterwards enjoyed by his eldest son, with the title of Baron Abercromby. —John, the fifth Baron (1841–1924), was a distinguished antiquary and wrote *Pre- and Proto-Historic Finns* (2 vols. 1898) and *Bronze Age Pottery of Great Britain and Ireland* (2 vols. 1912). —Sir Ralph's third son, James (1776–1858), entered parliament in 1807, held the office of Speaker (1835–39), and was then created Baron Dunfermline. He was author of a Memoir of the last eight years of his father's life (1861).

Aberdare, a town of Glamorganshire, part of Merthyr-Tydvil (q.v.) parliamentary borough, exports coal; pop. 55,000.

Aberdare, Henry Austin Bruce, Lord (1815–95), born at Duffryn, Glamorganshire, was Home Secretary (1868) and President of the Council (1873–74), with a peerage (1873). After him as President of the Royal Geographical Society the Aberdare Range in Africa was named.

Aberdeen, the chief city and seaport in the north of Scotland, is 98 miles NNE. of Edinburgh as the crow flies, and 528 NNW. of London. (The distances by rail are rather longer.) The burgh, which lies at the mouth of the Dee—the Don being 2 miles north of it—was founded somewhere about the 7th or 8th century. It was raided by Eystein, king of Norway, about 1150, and from that period it emerges into definite recorded history. It has been a royal burgh, with the right of foreign trade, since the time of David I. (1083–1153). The patron saint was St Nicholas (Santa Claus), to whom the mother-church of the city was dedicated, and it still bears his name. The figure of the patron saint was on the burgh seal, or coat of arms, up to 1430. Old Aberdeen (the name is a misnomer) is within the same parliamentary and municipal boundary. It had no history till Bishop Elphinstone had the precincts of the cathedral and the newly established King's College erected into a burgh of barony, with the bishop as baron, in 1498. Aberdeen is notable for its historical associations, for its educational record, its commercial enterprise, and its aspect as a city. The castle of Aberdeen, that stood on what is known still as the Castlehill, and was held by an English garrison for Edward I., was stormed by the forces of Robert the Bruce in 1308, and was then demolished. The hexagonal arcaded Market Cross (successor of an earlier one) was erected in 1686, on the model of the Market Cross of Edinburgh—the removal of which Sir Walter Scott so lamented in *Marmion*. It is now the finest historical market cross in Scotland, distinguished in particular by its general design, its central sculptured shaft and unicorn, and the medallion portraits of Stuart sovereigns that ornament the frieze. The cathedral, dedicated to St Machar, is the only granite cathedral in the British Isles. The Bridge of Balgownie, near the cathedral, a fine Gothic structure from the 13th century, is the oldest historical bridge of Scotland still in use; and the Bridge of Dee, built by Bishop Gavin Dunbar, 1520–27, is unique among the bridges of Britain for its (28) inscriptions and coats of arms. Education has been a leading interest of the city for centuries. In 1494 Bishop Elphinstone founded King's College and University, and in 1593 Marischal College and University was founded by the Earl Marischal. In 1860 these colleges were formed into one university, now fully equipped for arts, medicine, science, and divinity. Latterly great extensions have taken place in buildings and in provision for higher legal, technical, and commercial education. The city has over thirty splendid primary and secondary schools, all fully and keenly in use. The trade of Aberdeen has been of consequence since the 13th century. As the wardrobe accounts of Edward I. show, part of the provisions of the English armies that invaded Scotland consisted of dried fish from Aberdeen. The trade of the city now—both rail and sea-borne—is remarkably varied. Next to Grimsby it is the largest fish-supply centre in the British Isles. Its granite-trade has been remarkable since the later years of the 18th century, and its other industries include comb-making, paper-making, shipbuilding, cattle-breeding, grain-milling; linen, cotton, woollen, wincey, tweed, hosiery, and worsted glove manufactures; soap and candle-making, chemical-works, provision-curing, printing and book-binding, coach and motor-car building, engineering of all kinds, timber-working, &c. The main streets of the city are well laid out, and have a singular air of spaciousness that gives distinction to the appearance of the city. Since about 1820 the light-gray granite of the district, finely dressed, has been used in the buildings of Aberdeen, which,

from this cause, has become known as the 'Granite City.' The city has six public parks, besides the links; and the amenities of the city include statues in the main thoroughfares of the Duke of Gordon, first colonel of the Gordon Highlanders, of which Aberdeen is the depot (a granite statue by Thomas Campbell); General Gordon (bronze), by J. Stuart Burnett, A.R.S.A.; Queen Victoria (bronze), by C. B. Birch, A.R.A.; Edward VII. (granite), by Alfred Drury, R.A.; and a colossal bronze statue of Wallace, by W. Grant Stevenson, R.S.A. Five golf-courses are in use at Aberdeen, including the municipal course on the links, where golf has been played since before 1625. Literature and the fine arts have flourished in the city, more or less, since the days of Archdeacon Barbour, the father of Scottish poetry and history. The roll of distinctive names includes Boece, the historian; Arthur Johnston, Latin scholar and poet; George Jamesone, the first British portrait-painter of eminence; Andrew Robertson, miniaturist; James Beattie, of the 'Minstrel;' the Gregorys; W. Dyce, R.A.; J. Phillip, R.A.; Sir George Reid, P.R.S.A.; James Gibbs, architect; Sir James M'Grigor, founder of the modern British Army Medical Service; James Skene of Rubislaw, friend of Sir Walter Scott; his son, W. F. Skene, historiographer royal; John Hill Burton, historian; George Macdonald, novelist; Walter C. Smith, poet-preacher. The population of Aberdeen was nearly stationary up till A.D. 1700, when it was only about 6000. In 1800 it had increased to about 25,000, and at the census of 1921 it was 158,963. Formerly, as in other Scots burghs, the chief magistrate was known as 'Alderman,' but in 1501, following the lead of Edinburgh, Aberdeen discontinued the English title, and has used 'Provost' and 'Lord Provost' ever since. The parliamentary burgh is divided into the north and south divisions, each represented by one member.

Works on Aberdeen: *Annals*, W. Kennedy (1818); *Book of Bon Accord*, Joseph Robertson (1839); *Aberdeen: Traditions and History*, W. Robbie (1893); *Historical Aberdeen*, G. M. Fraser (1905); *Old Aberdeen*, Ella Hill Burton Rodger (1902); *Aberdeen University* (various works), P. J. Anderson; *History of the University*, J. M. Bulloch (1895); *Universities of Aberdeen*, R. S. Rait (1895).

Aberdeen, (1) a town of Mississippi, 28 miles N. of Columbus, at the head of navigation of the Tombigbee River, trades in the products of the neighbourhood, chiefly cotton, cotton-seed and oil, cattle, hides, wool, and dairy products; pop. 4000.—(2) A town of South Dakota, 80 miles N. of Huron; it is the trading centre of a rich agricultural region; pop. 15,000.

Aberdeen, a town of the Cape of Good Hope, situated at the foot of the Camdeboo Mountains, 166 miles (by rail and road) NW. of Port Elizabeth. It has busy cattle-fairs. Pop. 2700 (1770 white).

Aberdeen Doctors, in whom was centred the opposition to the National Covenant in 1639, were Forbes, Baron, Leslie, Scroggie, Sibbald, and Ross.

Aberdeenshire, the sixth in size and the most easterly of the Scottish counties, has a maximum length of 102 and breadth of 50 miles, with 65 miles of sea-coast and an area of 1970 square miles. It has a south-west and north-east direction. Of the whole area almost exactly 50 per cent. is under cultivation. The county is almost purely agricultural, with sheep and cattle breeding, and as a cattle-breeding and cattle-feeding area it is unsurpassed in Scotland. The chief crops are oats, barley, and turnips; and the soil—clay near the coast, loam towards the middle, and gravelly, sandy, and peaty elsewhere—is cultivated to its utmost capacity. Inland the county is hilly, and in the upland south-western region it becomes mountainous, the lofty Grampian range forming part of its boundary. The scenery in those parts is desolate and grand. Remains of early culture are abundant in the county in the form of stone circles, hill forts, earth-houses, prehistoric cairns and grave-mounds, and sculptured stones; and the number of feudal castles is quite remarkable. No fewer than eighty-one such exist in the county, in ruins or still occupied, dating from the 14th century onward. Balmoral Castle is the chief seat, but dates only from 1853–56, whereas Drum Castle, near Aberdeen, has been occupied continuously by the Irvine family since the property was granted to them by Bruce. The Romans crossed the county at Culter, about 7 miles west of Aberdeen, where a turf camp exists, connecting on the one hand with Raedykes Camp, Stonehaven, and on the other with Glenmailen Camp, Ythan Wells, both of which have been excavated, and found to be of typical Roman construction. The chief towns of Aberdeenshire are Aberdeen, Peterhead, Fraserburgh, Huntly, Inverurie, Kintore, Turriff, Ellon, Oldmeldrum, Ballater, and Braemar. The rainfall is moderate, and the mean temperature, while slightly under the average for Scotland in summer, is slightly above the average in winter. Education is on a high level, and industry, thrift, and intelligence are markedly characteristic of the people.

See *The Making of Aberdeenshire*, by W. Alexander (1888); *Aberdeenshire*, by A. Mackie (1911); *History*, by W. Watt (1900). The population is 300,980.

Aberdeen, GEORGE HAMILTON GORDON, EARL OF, was born at Edinburgh, 28th January 1784. He was educated at Harrow and at St John's College, Cambridge, where he took his M.A. in 1804. On succeeding to the earldom in 1801, he had made a tour through Greece; hence Byron's line: 'The travell'd thane, Athenian Aberdeen.' In 1806 he was elected one of the Scottish representative peers, and entered the House of Lords as a Tory. In 1813 he was appointed ambassador to Austria, and conducted the negotiations which led to the alliance of that power with Britain. At this time he formed a close friendship with Prince Metternich which decidedly influenced his policy. On the conclusion of the war, he was raised to the British peerage as Viscount Gordon. In 1828 he took office in the Wellington ministry. The general principle which guided his policy as Foreign Secretary was that of non-interference in the internal affairs of foreign states, which, joined to his sympathy with such statesmen as Metternich, exposed him—not always justly—to the suspicion of hostility to the cause of popular liberty. His gradual abandonment of high Tory principles was evinced by his support of the repeal of the Test and Corporation Acts, and of the Catholic Emancipation Act. For eleven years after the fall of the Wellington ministry he remained out of office, with the exception of his brief administration of the Colonial Office in the Tory government of 1834–35. In 1841 he again became Foreign Secretary, his chief services as such being the conclusion of the Chinese war, the Ashburton Treaty, and the Oregon Treaty. With Guizot he acted in cordial alliance. His act (1843) for removing doubts regarding the admission of ministers to benefices in Scotland could not heal the Disruption, and was virtually repealed by the Act for the Abolition of Patronage, 1874. Like Peel, he was honestly converted to free-trade principles, and with Peel he resigned in 1846, immediately after the repeal of the Corn Laws. In 1852, on the resignation of Lord Derby, Aberdeen became head of a popular coalition ministry, which lost credit owing to mismanagement in the Crimean War (q.v.). The government was defeated by Roebuck (q.v.), and in February 1855 Aberdeen resigned. He died in London, 13th December 1860.

See Lives by his son (1893), Lady F. Balfour (1922). —His grandson GEORGE (1841–70), 'the Sailor Earl,' drowned at sea, was succeeded by his brother JOHN (b. 1847), seventh earl and first marquess (1915), Lord-lieutenant of Ireland (1886 and 1905–15), and in 1893–98 Governor-general of Canada.

Aberdevine. See SISKIN.

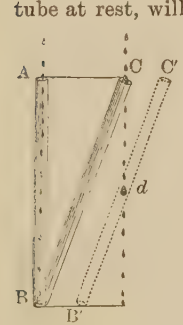
Abergavenny (the Roman *Gobannium*), a market-town of Monmouthshire, at the influx of the Gavenny to the Usk, 13 miles W. of Monmouth. It has remains of an old castle and of a priory. There are collieries and ironworks in the neighbourhood. Pop. 9000.

Abergele, a health-resort and market-town of northern Denbighshire, 4½ miles W. of Rhyl; pop. of the urban district (which includes Pensarn) 2600.

Abernethy, a small police-burgh of Perthshire, near the Earn's influx to the Tay, 8½ miles SE. of Perth. The ancient capital of the Picts, and from 865 till 908 the seat of the sole Scottish bishopric, it retains one of the three Round Towers (q.v.) in Scotland, 73 feet high. Pop. 600.

Abernethy, JOHN, an eminent English surgeon, was born in London, 3d April 1764. His grandfather, the Rev. John Abernethy (1680–1740), an Irish Presbyterian clergyman, acquired distinction by his controversial writings. Abernethy was educated at Wolverhampton grammar-school, and in 1779 was apprenticed to the assistant-surgeon at St Bartholomew's Hospital. In 1787 he was himself elected assistant-surgeon to St Bartholomew's, and soon after began to lecture on anatomy and surgery. At first, he manifested extraordinary diffidence, but his power soon developed itself; and his lectures at last attracted crowds. His clear, simple, positive style, illustrated by an inexhaustible fund of apt anecdotes, made him the most popular medical teacher of his day. In 1813 he was appointed surgeon to Christ's Hospital, in 1814 Professor of Anatomy and Surgery to the College of Surgeons, and in 1815 full surgeon to St Bartholomew's, a post which he resigned in 1829. His practice increased with his celebrity, which the eccentricity and rudeness of his manners contributed to heighten. He died at Enfield, 28th April 1831. Of his Works (4 vols. 1830) the most original and important is his *Observations on the Constitutional Origin and Treatment of Local Diseases* (1809), in which a simple principle, till then little attended to, was made the foundation of much important and ingenious observation. See his Life by George Macilwain (2 vols. 1853).

Aberration of Light is an apparent alteration in the place of a star, arising from the motion of the earth in its orbit, combined with the progressive passage of light. When rain is falling perpendicularly, a drop entering at the top of an upright tube at rest, will go through; but if the tube be carried forward horizontally, a drop entering the top will strike against the side before it goes far: to make the drop go through the tube in motion, we must incline the top of it forward in the direction of the motion. The amount of this inclination will be the greater, the more rapid the motion of the tube is compared with that of the falling drops. If in the time that a drop takes to fall through the height, AB, of the parallelogram in the annexed cut, the inclined tube, BC, is moved horizontally over a space equal to its breadth AC, a drop entering the top of the tube will descend without touching the sides. For in half the time, the tube will be in the position B′C′, and the drop in the position *d*; and so for any other portion of the time. This exactly illustrates the astronomical phenomenon in question. The tube is a telescope directed to receive the light of a star; this tube, and the person looking through it, are moving along with the earth in its orbit, and the light may be conceived as particles coming from the star like drops of rain, moving much faster no doubt, still requiring time. That a particle or ray of light from the star may pass through the tube, it must be directed, not straight to the star, but at a slight angle in the direction of the earth's motion. Thus the place where we see the star is not its true place. As the earth's motion, however, is slow compared with the velocity of light, the angle of inclination is small—never exceeding about 20″. The result is, that, if we conceive the true place of a star as a fixed point, the apparent place of the star describes about this true place, in the course of a year, an ellipse whose greater axis is about 41″. In the case of stars near the pole of the ecliptic, this ellipse approaches to a circle, while for stars in the plane of the ecliptic, it contracts to a line about 41″ long. The aberration of light was discovered by the English astronomer Bradley in 1727, while seeking to determine the parallax of certain fixed stars. See RELATIVITY; and, for spherical and chromatic aberration, LENSES.



Abersychan, an urban district of Monmouthshire, 2 miles NW. of Pontypool. The population, 27,087 in 1921, is largely employed in the coalmines and iron works of the neighbourhood.

Abertillery, an urban district of Monmouthshire, 17 miles NNW. of Newport, with tin-plate works and collieries; pop. (including Llanhilleth) 39,000.

Aberystwyth, a seaport and municipal borough of Cardiganshire, on the Ystwyth, at its mouth in Cardigan Bay, 224 miles NW. of London by rail. It is the seat of the University College of Wales (1872; partly burnt 1885, and rebuilt 1887), with a principal and staff of over twenty professors or lecturers, and of the National Library of Wales (1911). There are remains of a castle (1109). Its fine situation and climate combine with its marine terrace and promenade pier to make Aberystwyth a favourite bathing-place. Till 1885 it was one of the Cardigan parliamentary boroughs. Pop. 11,000.

Abeshr, the capital of Wadai, has about 15,000 inhabitants.

Abeyance, an English law term denoting the condition of an inheritance which has no present owner. The law considers such an inheritance as potentially existing and ready to vest whenever a proper owner appears. The term is now used chiefly in connection with peerages. Thus a peerage is said to be in abeyance when there is for a time no person in whom it can vest. In the law of real property, and, in particular, in the development of the doctrine of contingent remainders, the conception of an estate or inheritance as being in abeyance has played an important part. So when a parson dies the fee-simple of the glebe, i.e. of land attached to the benefice, is in abeyance until his successor is appointed.

Abgar is the name or title of twenty-eight princes of Edessa (q.v.) in Mesopotamia. The most notable of these princes is the fifth of the name, a contemporary of Jesus, said to have written a letter to Jesus, and to have received an answer from him. These letters, translated into Greek from the Syriac by Eusebius of Cæsarea, were denounced as spurious by Pope Gelasius in 494, and soon lost all credit. The letter from Abgar contains a request that Jesus should visit him, and heal him of a certain disease. In the reply,

Jesus is represented as promising to send a disciple to heal him after his ascension. For other fables in this connection, see Lipsius, *Die Edessenische Abgarsage* (1880).

Abhorrers, the name of the court party in the reign of Charles II. (afterwards *Tories*) who *abhorred* the views of the *addressers*, or opponents of the royal prerogative.

Abich, Wilhelm Hermann, geologist and traveller, was born at Berlin, December 11, 1806. He studied at Berlin, became professor at Dorpat in 1842, Fellow of the St Petersburg Academy in 1853, and after 1877 lived at Vienna. He explored the Caucasus region, the Armenian highlands, and Northern Persia, and his published works are invaluable geological and meteorological memoirs on these countries. He died 2d July 1886.

Abies. See Fir.

Abigail, wife of Nabal, a wealthy chief at Carmel, who refused common hospitality to David when an outlaw from the court of Saul. David was on his way to punish Nabal for his churlishness, when Abigail hastened to meet him with a present, and so charmed him that, on the death of her husband soon after, he at once took her to wife (see 1 Sam. xxv.).—The name *Abigail* has passed into a general name for a waiting-maid or lady's-maid, from the title of 'handmaid' applied to herself by Abigail in her address to David.

Abingdon, a municipal borough of Berkshire, situated at the junction of the Ock and the Thames, 6 miles S. of Oxford, and 60 WNW. of London. Abingdon was an important place in the 8th century, and its Benedictine abbey, rebuilt in 955, was very rich. It has two old churches, a school founded in 1563, and a clothing manufactory. Till 1885 Abingdon returned a member to parliament. Pop. 7000. See a history by Townsend (1910), and that of the abbey by Stenton (1913).

Abingdon (1) a town of Illinois, 9 miles S. of Galesburg, has brick and tile works, shirt-factories, &c.; pop. 2700.—(2) A town of Virginia, with several colleges and cigar factories; pop. 2500.

Abinger, Baron. See Scarlett.

Abington, a manufacturing town of Massachusetts, 20 miles SE. of Boston; pop. 6000.

Abington, Frances (1737–1815), a daughter of a common soldier called Barton, from being a flower-girl about the London theatres, passed to the stage in 1755. She married Abington, her music-teacher, but soon separated from him; played under Garrick at Drury Lane and at Covent Garden; was the original Lady Teazle; and at her retirement in 1799 was the first comic actress on the stage.

Ab'iogenesis, a term applied by Huxley in 1870 to Spontaneous Generation (q.v.).

Abipones, a powerful and war-like tribe of South American Indians in the Gran Chaco (q.v.), now extinct, who were very formidable enemies to the Spaniards. Dobrizhoffer wrote their history.

Abjuration. See Allegiance.

Abkhasia, or Abasia, a district of Georgia, between the Caucasus and the Black Sea, with Mingrelia to the SE. It is mountainous, with deep, well-watered and fertile valleys. The population is partly Mingrelian but mainly Abkhasian (see Caucasus), though many of the Abkhasians migrated to Turkish territory before and after 1878. Russia took possession of Abkhasia in 1824, but subdued the people only in 1864. In 1921 it was erected into an autonomous Soviet republic (within Georgia), with Sukhum for capital.

Ablaut is the variation of the vowel of a root, depending apparently upon the position of the accent in the parent Indo-Germanic language. It appears especially in the various tenses of the verb in English, German, and Greek. Thus in *drive, drove, driven*, the original vowels were *ei, oi, i*, as in Greek *leipō, leloipa, elipon*. The German name for this gradation has now been generally adopted. Compare Umlaut.

Ablution, a ceremonial washing of the whole body, or some part of it (commonly the hands), for the purpose, not of material cleansing, but of special consecration before prayer or other religious observance, or for purification from ritual uncleanness or tabu. The custom is widespread. Various liquids have been used, as the blood of a pig for the purification of a homicide among ancient Greeks and modern Nicobar Islanders. In the Taurobolium of the Attis cult the worshipper stood under a grating and was drenched with the blood of a bull sacrificed above. Nor is the notion of the washing away of sins by blood unknown to Christians, though no such rite be actually practised among them. Water, however, is the usual medium. Among primitive peoples in all parts of the world uncleanness is incurred by the shedding of blood (whether the act be held a crime, an ordinary necessity, or an honourable exploit), by any association with death or birth, by the performance of sexual functions, by contact with that which is unclean, and by other acts and accidents. The unclean person is subject to tabu, and danger to himself and those whom he may infect—danger from the ghost of the slain, for example—can only be averted by purifying rites into which seclusion, hair-cutting, fire, sacrifice, fasting, and the like may enter, as well as bathing.

The laws prescribing the washing of the whole body in such emergencies among the Jews are to be found scattered through the books of Leviticus and Numbers. Washing of hands is practised to-day by the Jews before every meal at which bread is eaten, before prayer, after unclean bodily functions, and after contact with an unclean object. A dry clean substance (as a cloth) may be used when water is unobtainable.

The Mohammedans perform ablutions before their prescribed prayers (five times a day), before touching the Koran, and after ritual defilement. See also Baptism, Churching of Women, Holy Water, Lustrum, Tabu.

Abo (Finnish *Turku*), the second town of Finland, on the Aurajoki, near the Gulf of Bothnia, 170 miles WNW. of Helsingfors by rail. It has a winter harbour, and is one of Finland's chief commercial and industrial towns. Founded in the 11th century, capital of Finland till 1819, Åbo is still the seat of the archbishop and an appeal court. Its university was transferred to Helsingfors after the great fire of 1827. A new Swedish university was founded in 1918; a Finnish in 1922. There is a 12th-century castle. A peace between Sweden and Russia was signed here in 1743. Pop. 60,000, over a fifth Swedish.

Abolitionists, a party in the United States who sought the immediate and total abolition of slavery, politically important from about the close of the 18th century. Abolitionist views had long been held by many, especially by members of the Society of Friends; but the term was not commonly used until an aggressive party spread from New England throughout the north and west. After about thirty years of agitation, the abolitionists got some of their doctrines adopted by the republican party. Their ends were gained when, under Lincoln's administration, slavery was abolished, 1863–65. See Garrison, Slavery.

Abomey. See Dahomey.

Abor Hills, a district on the borders of Assam and Tibet, inhabited by a wild people of Mongolian type, the Abors.

Abori'ginés (Lat.), properly the earliest inhabitants of a country. The corresponding term used by the Greeks was *Auto'chthŏnës*. The Roman and Greek historians, however, apply the name Aborigines to a special people, who, according to tradition, had their original seats in the mountains about Reate; but, being driven out by the Sabines, descended into Latium, and in conjunction with a tribe of Pelasgi, subdued or expelled thence the Siculi, and occupied the country. The Aborigines then disappear as a distinct people, they and their allies the Pelasgi having taken the name of Latini. The non-Pelasgic element of the Roman population is supposed to represent these Aborigines, who would thus belong to the Oscans or Ausonians. The name is applied generally to the original or native inhabitants of a country as opposed to an intrusive conquering race, or to colonists and their descendants.—An Aborigines Protection Society was founded in 1838, to take all possible means for protecting the natives of various countries from murder and ill-usage generally at the hands of colonists and other white men.

Abortion is the term used in Medicine to denote the expulsion of the product of conception (the impregnated ovum) from the womb before the sixth month of pregnancy. If the expulsion takes place after that date, and before the proper time, it is termed a *premature labour*. *Miscarriage* is a popular term covering both. The frequency of abortion as compared with normal pregnancy is very differently estimated by different writers; but the best evidence leads us to the belief that abortion is of far more common occurrence than is generally supposed, and that it takes place on an average in one out of every six or seven cases of pregnancy. The following are amongst the *causes predisposing* to this accident: (1) a diseased condition of either parent, and especially a syphilitic taint; (2) most fevers, and many other acute diseases occurring during pregnancy; (3) any condition interfering with the health of the mother—e.g. the constant breathing of impure air, insufficient nourishment, hard work, &c.; (4) disorders and displacements of the womb, &c. Amongst the *direct causes* of abortion may be placed blows on the abdomen, falls, any violent muscular efforts, too long a walk or ride on horseback (indeed, women with a tendency to abort should avoid violent exercise during pregnancy), a severe mental shock, &c. Moreover, the death of the fœtus from any cause is sure to occasion abortion.

Symptoms.—Abortion is sometimes preceded by feverishness, shiverings, a feeling of weight in the abdomen, or other discomfort. But the first certain indication of threatened abortion is usually hemorrhage, followed, if not arrested, by pain, which after the second month more or less resembles the pain attending normal labour.

In the *treatment* of abortion, prophylactics (or the guarding against causes likely to lead to it) hold the first place. Women liable to this affection should, on the slightest threatening, assume as much as possible the horizontal position, avoiding all bodily exertion or mental excitement. They should use non-stimulating foods and drinks, and keep the bowels open by gentle aperients—such as fruit and castor-oil—and carefully avoid aloes and other medicines irritating the lower bowel. Moreover, a separate bedroom must be insisted on by the physician. We shall only enter into the curative treatment so far as to state that if it is deemed necessary to check hemorrhage before professional aid can be called in, cloths soaked in cold water may be applied locally (care being taken to change them before they grow warm), and iced water, together with a small dose of laudanum (10 drops), may be given internally. Further proceedings must be left to the medical attendant. At least as much attention must be paid to rest subsequently as after a normal labour; for abortion, if not very carefully attended to, is one of the most frequent causes of uterine disease.

There are occasional cases (as where the outlet of the pelvis is very contracted) in which it is necessary to induce abortion by professional means, but it would be out of place to enter into this subject in these pages. It cannot be too generally known, that all attempts at procuring criminal abortion, either by the administration of powerful drugs, or the application of instruments, are accompanied with extreme danger to the pregnant woman.

Criminal Abortion.—Neither in the law of England nor of Scotland is it murder to kill a child in the mother's womb (although it would be murder of the mother, if she died in consequence of the treatment). Such a crime is called criminal abortion, and in England is defined by statute as the unlawfully administering to a woman any poison or noxious drug, or using any surgical instrument or other means, with the intent of procuring miscarriage, whether the woman be pregnant or not. A pregnant woman may commit this crime on herself. In Scotland procuring abortion is a crime at common law, and in both countries it is punished by penal servitude or imprisonment, according to circumstances. Moreover, any one who supplies or procures a drug or instrument, knowing that it is intended to be unlawfully used to bring about the miscarriage of a woman, is punishable. There is a regular trade in abortion, mechanical violence being most often employed to produce the effect. The drugs used are divided into the class of emmenagogues and that of ecbolics, ergot of rye being the most popular. There are many predisposing causes to abortion, both in the mother and in the fœtus, which must be allowed for.

In the United States abortion is a crime at common law, and severely punished by fine and imprisonment. The common law has been strengthened by various statutes directed against attempts to procure miscarriage. Consent of the woman is no defence. It is a misdemeanour for any person knowingly to deposit for mailing or delivery any article or thing designed or intended to procure abortion.

In biology the term abortion is used for the arrested development of an organ, which is reduced to a vestige or rudiment.

Aboukir, or Abu-Qir, a village on the coast of Egypt, 13 miles NE. of Alexandria. Near it is the ancient Canopus (q.v.). Aboukir stands at the west end of the Bay of Aboukir, which stretches eastwards to the Rosetta mouth of the Nile. This bay is celebrated on account of Nelson's great victory over the French fleet, August 1, 1798, the famous 'Battle of the Nile.' The French fleet was not merely defeated, but almost annihilated; the flagship of the admiral De Brueys blew up, and only two ships escaped. Here Napoleon in 1799 defeated a Turkish army; and here Sir Ralph Abercromby's expedition landed in 1801 in the face of the enemy.

Abousambul. See Abu-Simbel.

About, Edmond François Valentin, an eminent French author, was born at Dieuze, in Lorraine, February 14, 1828. After a brilliant course at the Lycée Charlemagne and École Normale in Paris, he went for two years to study archæology at Athens, and on his return about the end of 1853, he published *La Grèce contemporaine*, a clever popular satire on modern Greek society. Its success opened to the young author the columns of the Paris journals, and in the *Revue des Deux Mondes* ere long appeared his first novel, *Tolla Feraldi*, republished

in 1855. About was accused of having taken many of the incidents of this story from a little-known Italian book, *Vittoria Savorelli*, and his reputation hardly recovered this charge until the appearance in the *Moniteur* of his series of stories, *Les Mariages de Paris*. From that time his literary career was a series of successes. His next novels were *Le Roi des Montagnes* (1856), a story full of humorous incident, which pleased everybody except the Greeks; and *Germaine* (1857), a clever story of contemporary Parisian life. Four other novels of note must be named: *Les Échasses de Maître Pierre* (1858), *Madelon* (1863), *La Vieille Roche* (1865), and *Le Roman d'un Brave Homme* (1880), the last an attempt, that had less success than it deserved, to show the French public that a novel may be interesting and yet fitted for general reading. None of About's works deserved their popularity more than his three short fantastic tales, *L'Homme à l'Oreille Cassée*, *Le Nez d'un Notaire*, and *Le Cas de M. Guérin*, all published in 1862; while his *Trente et Quarante* (1865), *L'Infâme* (1867), and *Les Mariages de Province* (1868), would of themselves have made a reputation. About contributed constantly to the journals of the day, and wrote many plays, few of which, however, were successful on the stage. As a publicist, he enjoyed a wide though mainly factitious reputation, several of his pamphlets being understood throughout Europe to be written with the approval of the Emperor of the French. As a newspaper correspondent he was present at the opening of the Suez Canal, and accompanied Macmahon in the Franco-German war. His *Alsace* (1872) and some newspaper articles cost him a week's imprisonment at the hands of the German authorities, who chose to treat him as a German subject, because he had been born in Lorraine. About had been decorated with the Cross of the Legion of Honour in 1868, and in 1884 received the coveted distinction of election to the Academy, but died just before he was formally received, January 17, 1885.

Abracadabra, a magical word or formula constructed out of the letters of the alphabet, and supposed to be highly efficacious for the cure of agues and fevers. The letters were written so as to form a triangle, capable of being read many ways on a square piece of paper, which was folded or stitched into the form of a cross; worn as an amulet in the bosom for nine days; and ultimately thrown backward before sunrise into a stream running eastward. The adjoining is one way of arranging this mystic word.

A B R A C A D A B R A
A B R A C A D A B R
A B R A C A D A B
A B R A C A D A
A B R A C A D
A B R A C A
A B R A C
A B R A
A B R
A B
A

Abraham. Our knowledge of Abraham is obtained from the account of his life in Gen. xi.–xxv., and this was derived by the author of Genesis from the three sources of the Pentateuch (q.v.) known as P., J., and E. Putting the facts together, the following is a brief summary of his career. Abraham, originally known as *Abram*, was the son of Terah, a descendant of Shem, and seems, according to one tradition, to have come originally from Ur of the Chaldees. This site, long supposed to be in northern Mesopotamia, is now identified with the ruin-mounds of El Muqayyah, low down on the western side of the Euphrates. In Ur, Abraham married his half-sister Sarai (afterwards Sarah). From Ur, Terah with his family migrated up the valley of the Euphrates to Haran, in the north-west of Mesopotamia; and there Terah died. Another tradition makes Haran his original home. Abraham, accompanied by his nephew Lot, and apparently at the head of a numerous following, received a call from Jehovah, in obedience to which he passed west and south into Canaan, and established himself for a time at Sichem. Thence as a nomadic chief or sheikh he wandered towards the South, and was driven by famine into Egypt, where Sarah was taken by Pharaoh into his harem. A similar outrage is represented as having befallen her at the hands of Abimelech, the Philistine king of Gerar, when well advanced in years. (See Gen. xx., and compare the story of Abimelech and Rebekah in Gen. xxvi. 9). Returning from Egypt into Southern Palestine, Abraham and Lot parted company; and Abraham pitched his tent at Mamre, near Hebron, which continued the headquarters of his family and tribe until his death. Abraham was wealthy in flocks and herds, and could bring into the field an army of his warlike nomadic tribesmen sufficiently powerful to meet and defeat four kings in battle, so as to rescue his nephew Lot when taken captive. His first-born son, Ishmael, was born to him in his 87th year by Hagar, an Egyptian slave. Jehovah appeared to him more than once; made a covenant with him, granting the land for ever to his descendants; and promised a son by his wife Sarai, whose name was changed to Sarah, as his own was from Abram to Abraham. The rite of circumcision now instituted marked the covenant people from the Canaanites. Sarah's son, Isaac, was born when her husband was 100 years old. Then came the mysterious proving of Abraham by God, when God commanded that Isaac should be offered up as a human sacrifice on a mountain in the land of Moriah, the ram being ultimately substituted for the well-beloved son. Sarah died, and was buried in the cave of Machpelah, near Hebron, in a patch of ground bought by Abraham; and afterwards, apparently when he was upwards of 130 years of age, Abraham married Keturah, and became the father of six sons by her. On his death, at the age of 175, he was buried beside Sarah in the cave.

His life, apart from his special covenant relations, is that of a wealthy and powerful oriental pastoral chief, dignified and generous, true to his word, loyal to his kindred, devoted and faithful to his God. Jews and Christians alike accept him as the type of perfect faith and true religion, 'the friend of God;' 'Ibrahim' is, for all good Moslems, the 'father of the faithful.' Numerous non-scriptural traditions add little of importance to the picture given in Genesis, and completed by allusions in the later Scriptures; though the Mohammedans tell many picturesque tales to illustrate his character; bring Abraham to Mecca to build the Kaaba (q.v.), and believe his remains to have been covered by the famous mosque near Hebron. The later Jews and Mohammedans select Abraham as the incarnation of perfect wisdom, and attribute to him the invention of writing. He was regarded as the ancestor not merely of the Israelites and the Ishmaelite Arabs, but of the other races in Northern Arabia, of Edomites (through Esau), and Midianites.

There has been much discussion among modern scholars as to the historical value of the narrative of Abraham's life. Some regard him as an entirely mythical personage, or as the impersonation of the typical virtues of the religious Israelite. The most common theory regards the story as embodying traditions and recollections of racial movements. Abraham is the leader of a great nomadic movement of the Hebrews who migrated from Babylonia into Palestine. The references to Lot indicate the separation of Moab and Ammon from the original Semitic stock. The introduction of Hagar into the story suggests that the new community inter-

mingled with the primitive inhabitants of Canaan and Egypt. It is unlikely that all the details are to be regarded as literal history. See commentaries by Delitzsch, Dillmann, Skinner, Bennett; also UR.

Abraham, the Plains of, or Heights of, close to the city of Quebec, were the scene of the battle between Montcalm and Wolfe, 13th September 1759. They were so called from A. Martin, a pilot known as 'Maître Abraham.' See WOLFE.

Abraham-a-Santa-Clara, the monastic name of Ulrich Megerle, a very eccentric but popular German preacher, who was born near Mösskirch, in Swabia, 4th July 1644, and died in Vienna, 3d December 1709. He was provincial prior of the Augustinians, and court preacher at Vienna. Though uncouth puns, sharp and homely satire, and strange freaks of humour, marked his sermons, he was sincere at heart, and unsparing in his censure of the vices alike of courtiers and the people. His collected works fill 21 vols. (1835–54). See works by Von Karajan (1867) and Bertsche (1918).

Abraham-men, a class of sturdy beggars who simulated lunacy, and wandered about the country in a disorderly manner; at one time working on the sympathy, and at another on the fears of women, children, and domestics. They were common in Shakespeare's time, and, it would seem, existed even as late as the period of the civil war. The term is a cant one, as old at least as 1561. An 'Abram cove' meant one who personated a 'Tom o' Bedlam.' He 'would disguise himself in grotesque rags, with knotted hair, and with many more disgusting contrivances to excite pity;' but he did not hesitate to live by thieving too, and when detected pilfering, or in any species of depredation, he pleaded the immunities of the real Bedlamite, who was formally permitted to roam about the country when discharged from 'Bethlem Hospital.' A verbal relic of this class is still preserved in the slang phrase, 'to sham Abraham.'

Abrantes, a town of Portugal, on the Tagus, 84 miles NE. of Lisbon; pop. 7000. Abrantes gave a ducal title to the famous Junot (q.v.).

Abravanel. See ABARBANEL.

Abraxas. See GOOSEBERRY CATERPILLAR.

Abraxas Stones are so called from having the word *abraxas* or *abrasax* engraved on them. They are cut in various forms, and bear a variety of cabbalistic symbols, mostly composed of a human body, a fowl's head, and serpentine extremities. These gems are common in collections, and are represented as coming from Syria, Egypt, and Spain. The use of the name Abraxas was at first peculiar to the Gnostic sect of the Basilidians; and as the word, by taking the numerical value of its Greek letters, signifies the number 365, the Basilidians used it to indicate the 365 orders of spirits believed by them to emanate from the Supreme God (see BASILIDES). The doctrines and phrases of the sect were carried by the Priscillianists to Spain. But similar symbols were afterwards adopted by all sects given to magic and alchemy; and there is little doubt that the greater part of the abraxas stones were made in the middle ages as talismans.

Abrogation means the repeal or annulment of a law or established usage. In Roman law even an express statutory enactment might be abrogated by desuetude, on the principle that long-continued usage was a tacit consent equivalent to legislation (Dig. 1. 3. 32). The law of Scotland has adopted this principle to the effect that Acts of the Scots Parliament before the Union may lose their force without express repeal. Where such a statute deals with two separate matters, it may be in desuetude as regards one of these matters and remain in force as regards the other; but a statute, unless it consists of such separable portions, cannot be partially in desuetude in respect of its application (*McAra v. Magistrates of Edinburgh,* 1913, S.C. 1059 per Ld. Pres. Dunedin). In England a law is not abrogated by becoming obsolete. See DESUETUDE, STATUTES.

Abrus. See PRAYER BEADS.

Abruzzi, a district of Central Italy, was formerly the north-east corner of the kingdom of Naples, in the wildest and loftiest portion of the Apennines. The jagged mountain-groups reach in the Gran Sasso d'Italia an elevation of 9600 feet. The climate of the Abruzzi is raw in the higher regions; snow rests on the hills from October to April, and on some of the peaks all the year round; but the valleys are extremely fertile. Dense forests clothe the sides of the mountains. The Abruzzi used to have three divisions—Abruzzo Ulteriore I. and II., and Abruzzo Citeriore, corresponding to the provinces of Chieti, Teramo, and Aquila respectively, until Pescara was carved out in 1927. These form, with the province of Campobasso, the *regione* of 'the Abruzzi and Molise.'

Abruzzi, LUIGI AMEDEO, DUKE OF THE, third son of Amedeo, Duke of Aosta (see AMADEUS of Spain), was born at Madrid in 1873. He climbed Mount St Elias (1896), Ruwenzori (1906), and Kenya; and in 1899–1900 got nearer the North Pole than Nansen. He climbed Mount Godwin-Austen to the height of 24,600 feet in 1909. He commanded the Italian navy (1914–17) in the European war.

Absalom, the third son of David, king of Israel, remarkable for his beauty, his unnatural rebellion against his father, and his tragic death at the hands of Joab (see 2 Sam. xviii.).

Absalon, Archbishop of Lund. See AXEL.

Abscess (Lat. *abscessus,* a going away), a circumscribed collection of purulent matter formed by disease within some tissue or organ of the body. The process by which an abscess is formed is the following: First, the capillary vessels become overcharged with blood in consequence of inflammation. From the blood thus made stagnant, or flowing very feebly, a much larger amount of fluid than in health, with numerous white blood-corpuscles, exudes through the walls of the capillary vessels, and becomes *Pus* (q.v.) or *matter.* This matter, at first contained in the minute interstices of the tissues, gradually breaks them down, and makes for itself a larger cavity; and frequently, by disintegration of the adjacent parts, works its way either to the surface or to some natural cavity of the body. Pus thus makes its appearance often in a different part of the body from where it was formed. The abscess cavity is bounded by an inflamed and swollen layer of tissue; not, however, containing pus. Occasionally, when the purulent matter does not find any outlet either naturally or artificially, it is gradually dried up or absorbed. In the great majority of cases, however, cure only takes place after the pus has been discharged. Abscesses may be *acute,* forming in a few days with much pain; or *chronic* or *cold,* taking weeks or months to form, with little or no pain. In abscesses superficially seated—either in or close under the skin—the early treatment consists chiefly in promoting the formation of pus by the application of moist and warm bandages or poultices. The next step is the removal of the pus. When this is too long delayed, serious disturbance of the organ, and destruction of surrounding structures, may ensue. An abscess

must be regarded not as a distinct, original disease in itself, but as the result of another disease—inflammation; or as an effort of nature for the removal of injurious matters from the system. Abscess is now known in most cases to be caused by the presence of microscopic organisms in the tissues. See GERM THEORY, SUPPURATION.

Abscissa, the x-co-ordinate in analytical geometry. See GEOMETRY; also PARABOLA.

Abscise Layer, a layer of cells formed at the base of the stalk in most deciduous leaves. The fall of the leaf is brought about by the splitting of the layer, the portion left on the stem appearing as a leaf-scar, covering the wound with cork. Such leaves are said to be articulate. Others (as those of the oak and beech under certain conditions) are non-articulate.

Absentee, a term applied, by way of reproach, to landlords who derive their rent from one country, and spend it in another. It has been especially used in discussions on the social condition of Ireland. Before the Union of the parliaments of England and Ireland (1801), many large landed proprietors lived chiefly in the country during summer, and passed their winters in Dublin, thus spending much of their incomes among their dependents, or at least among their countrymen. The Union changed the habits of the Irish nobility and gentry, who were attracted to London as the political metropolis, or were induced, by the disturbed condition of Ireland, to choose residences on the Continent. Such proprietors were styled 'absentees'; and it was argued that their conduct was the great source of Irish poverty, as it drained the resources of the land; while in addition the Irish estates were left too much in the hands of agents and middlemen. A similar state of affairs existed in rural France before the Revolution. When the landlord does not live among his tenantry, there cannot grow up between him and them the sympathy and community of interest required for the general well-being. Absenteeism weakens the sense of responsibility in owners of property, who are too distant to know the real needs and circumstances of the trust committed to them. A great deal of the land of the United States and of Canada and Australia is held by proprietors living in Britain and on the continent of Europe; and so large sums are paid every year to owners who are so remote and know so little of their estates that they cannot possibly fulfil the recognised duties of property. In the Australasian states these objections have taken practical form. The New Zealand graduated land-tax is very much higher for absentees than for resident landowners; the Commonwealth's rate on absentees is also higher.

Absinthe is a spirit flavoured with the pounded leaves and flowering tops of certain species of *Artemisia*, chiefly wormwood (*A. absinthium*), together with angelica-root, sweet-flag root, star-anise, and other aromatics. The aromatics are macerated for about eight days in alcohol, and then distilled, the result being a green-coloured liquor. Adulteration with essential oils of other herbs, or even blue vitriol, is largely practised. The best absinthe used to be made in the canton of Neuchâtel, but the manufacture is now prohibited in Switzerland. When it is to be drunk, the greenish liquor is usually mixed with water; whereupon the precipitation of the contained volatile oil causes the mixture to cloud or whiten. The evil effects of drinking absinthe are very apparent; frequent intoxication, or moderate but steady tippling, utterly deranges the digestive system, weakens the frame, induces horrible dreams and hallucinations, and may end in paralysis or in idiocy. Absinthe came into common use in France through its being prescribed as a febrifuge to the soldiers during the Algerian war (1832–47); but its sale was forbidden in France in 1915. See WORMWOOD.

Absolute stands opposed to *relative*, and means that the thing is considered in itself, and without reference to other things. In physics, we speak of the *absolute* velocity of a body—i.e. the rate of its motion through space; and of the *relative* velocity of two bodies—i.e. the rate at which they approach or recede from one another, one or both being in motion. In the language of modern metaphysics, the Absolute is the unconditioned, unalterable original—that which is the ultimate cause and ground of the phenomena of the visible world. For the possibility of knowing the absolute, see CONDITION, PHILOSOPHY, RELATIVITY OF KNOWLEDGE, THEISM. In Chemistry, absolute alcohol is pure, unmixed alcohol. See ABSOLUTISM.

Absolution, originally a term of Roman law, signifies acquittal. The word is generally used in an ecclesiastical sense. In the primitive Christian Church, members who had given scandal by gross and open sins were excluded from the Lord's Supper, or from the congregation altogether, and could be readmitted only if they repented and underwent the penance laid upon them by the church. When they had done so, the presbyter, along with the elders, pronounced the absolution in presence of the congregation, and the congregation received the sinner again into their number. After auricular confession became obligatory, absolution was held to convey forgiveness in the sight of God. The formula, *Deus* or *Christus absolvit te*, which was used till the 12th century, was changed into *Ego absolvo te*. As defined by the Council of Trent, *absolution from sin* is a judicial act by which the priest as judge passes sentence on the penitent, and is a remission of sin made by authority of Christ in the sacrament of penance. It is not a mere declaration that God will pardon those who repent. It has been affirmed by some writers that instead of 'I absolve thee,' a precatory form, such as 'May Christ absolve thee,' uttered by the priest in presence of the person to be absolved, would suffice. But this is disputed. *Absolution from censures*, also granted by the priest with or without the sacrament of penance, is quite different, and merely removes the penalties imposed by the church, and reconciles the offender with the church; whereas absolution from sin gives grace, removes guilt, and reconciles the sinner with God. *Absolution for the dead* is a form said after a funeral mass.

The Protestant churches mostly ascribe to the absolution of the clergy only a declarative, and not an exhibitive power; on the ground of repentance, it announces and assures forgiveness on the part of God, but does not impart it. From this view must, however, be excepted the Lutheran and Anglican formularies, Luther himself and an entire school of Anglican divines. For the Anglican documents, see the Prayer Book, especially the Exhortation to Holy Communion, and the Office for the Visitation of the Sick. The *catena* of English divines who hold this doctrine is not confined to one school, as it includes Archbishop Usher, and even Baxter. Nor must it be forgotten that the belief in a certain measure of absolving power residing in the whole church was widely spread in the middle ages; and the Sire de Joinville, a layman, tells how he and a brother knight in imminent danger, when no priest was to be had, mutually confessed and absolved each other. Peter Lombard entirely justifies such an act as that of Joinville; Aquinas seems to consider it irregular. In England, Sir John Friend and Sir William Perkins, convicted of having planned the assassination of William III., received at

Tyburn, just before their execution, a solemn and public absolution at the hands of a celebrated nonjuring divine, Jeremy Collier. The bishops censured this act on the ground that there was no proof of a previous confession having been made. See CONFESSION, PENANCE. In Scots law, the accused in a criminal case is absolved by the forms *absolvitor* or *assoilzie*, on the ground that evidence disproves or does not prove the charge.

Absolutism is a form of government in which the royal power is not limited by any constitutional check. The great era of absolutism in Europe was that which followed on the downfall of the feudal system. The form of monarchy then established was based on the subordination both of the nobles and the church to a strong centralising power, with large revenues and a regular army. The central power was represented by a monarch whose will was supreme. The old feudal nobles were transformed into courtiers. Not only the church, but law, science, and the universities were taken into his service. A professional army took the place of the old feudal militia. For the needs of such a state, a regular revenue, paid in money instead of the feudal payment in kind, was essential. Louis XIV., with his alleged dictum, *L'état, c'est moi* ('I am the state'), may be regarded as the representative absolute monarch. We had a milder form of it in England under the House of Tudor, the so-called personal monarchy. It should be recognised that the absolute centralising monarchy was a necessary stage in the evolution of the modern state. The centralising tendency was necessary for self-defence, and could be effected only by a strong monarch. The ruin of Poland was chiefly due to the fact that it never had a central government vigorous enough to repress the anarchic nobles, and weld the nation into one. The era of absolute monarchs was virtually closed by the revolutionary movements of 1789 and 1848, the effect of which was to establish representative institutions in most civilised countries. See AUTOCRACY.

Absorption. In Physics, when a quantity of matter or of energy enters into a substance so as to be associated with it in some way (excepting chemical combination in the case of absorption of matter) for a longer or shorter time, it is said to be absorbed by that substance. The nature of absorption differs, of course, with the nature of the thing absorbed and the nature of the absorbing substance. Thus gases are absorbed largely by some solids, the phenomenon being called Occlusion (q.v.) in this case. See also articles on Solution, Phosphorescence, Colour, Spectrum (for Absorption-spectrum), and especially that on Heat. The term absorption is also applied (1) in Animal Physiology to the osmosis of the dissolved matter of the chyle into the vessels of the intestinal villi; (2) in Vegetable Physiology, to the passage of water by endosmosis into the cells of the roots; and also (3) to the initial steps in the process by which the green parts of plants, in sunlight, absorb carbonic acid gas and decompose it. See PHYSIOLOGY (VEGETABLE). For absorption and absolvents in anatomy and medicine, see DIGESTION and LYMPHATICS.

Abstinence Societies, associations for the promotion specially of abstinence from all kinds of alcoholic liquors. See TEMPERANCE.

Abstract, in Law, means a short statement of the contents of a document, such as the *précis* writing in diplomacy, but in England it is used most commonly as the technical name of the summary of the deeds and facts constituting a title to land, which every seller is bound to furnish to the purchaser, unless the contrary has been stipulated. The form of this abstract is in four columns, each appropriated to a particular class of clauses in the deed, or of facts, such as dates, death, marriage, &c. Like the Scottish progress of titles, the abstract seldom goes back more than twenty years. If there is any defect in the abstract, the purchaser must object within a certain time by making a requisition. In the United States, where conveyancing is less complicated, abstracts are simpler than in England, and are usually prepared at the expense of the buyer.—ABSTRACT in Arithmetic is applied to numbers considered in themselves, and without reference to any objects numbered. See also CONCRETE.

Abstraction is that intellectual process by which the mind withdraws some of the attributes of objects from the others, and thinks of them to the exclusion of the rest. The abstract is opposed to the concrete. John, William, my brother, form concrete images in my mind, each with a multitude of attributes peculiar to himself. But they have also certain attributes common to them and to all individuals of the race; I can overlook the others, and attend to these, and thus form a notion or conception, which is called *a man*. Man is therefore an abstract notion, the word connoting, as it is called, a certain though not very well-defined number of attributes. With the exception of proper names, all nouns are thus abstract. There are degrees, however, in abstraction. The abstract notion *animal* rises above that of *man*, embracing all men and innumerable organised beings besides. An *organised being*, again, is a still higher stage, and embraces both animals and plants. Being, time, space, are among the highest abstractions. Abstraction is the basis of classification into genera and species (see GENERALISATION). The higher abstractions rise, the fewer attributes are implied or connoted in the name. On the other hand, the number of objects to which the name is applicable, increases; and thus reasoning in abstract terms has the advantage of being general, or extensive in its application. But such reasoning is apt to become vague and fallacious, unless constant regard is had to concrete instances.

Absurdum, REDUCTIO AD, a method of proving a truth indirectly, by showing that to suppose the proposition untrue would lead to an absurdity, or that the contrary of the proposition is impossible. The method is much used in geometry.

Abt, FRANZ, composer of song-music, was born 22d December 1819 at Eilenburg, in Prussian Saxony, and was educated at Leipzig, for a time as a student of theology. From 1841 to 1881 he held musical offices at Bernburg, Zürich, and Brunswick; in the latter year he retired with a pension to Wiesbaden. Of his tuneful settings, more than 200 in number, the best known is 'When the Swallows homeward fly.' He died 31st March 1885.

Abu (Arabic, 'father') is prefixed to many Arabic proper names, as the equivalent syllable *Ab* is prefixed to Hebrew names—Abu-bekr, &c. But *Abu*, like *Ab*, often signifies merely 'possessor;' as in Abulfeda (possessor of fidelity), 'the Trusty.'

Abu, a mountain of India, in the territory of Sirohi, Rajputana, a detached granite mass rising like an island from the plain of Marwar, near the Aravalli ridge, and in its highest point reaching 5650 feet above the sea. It is a celebrated place of pilgrimage, especially for the Jains, who have a magnificent group of five temples at Delwara, about the middle of the mountain, two of which are the most superb of all Jain temples. Both are built of white marble, finely carved, and date from 1031 and 1197 A.D. The mountain contains a beautiful lake (Nakhi Talao) 4000 feet above

the sea; and the region is a hot-weather resort for the government authorities and Europeans.

Abu-bekr ('father of the maiden') was so called as being the father of Ayesha, the wife of Mohammed, was born at Mecca in 573 A.D., and was a man of great influence in the Koreish tribe. He was the Prophet's most trusted follower; and in 632, when Mohammed died, was made the first khalif or successor of the Prophet. Ali, the Prophet's son-in-law, expected the succession, but submitted; the sect of the Shiites (q.v.) to this day protest that Abu-bekr was wrongfully appointed. Abu-bekr had to suppress the relapse of some tribes into heathenism; defeated the false prophet Mosaylima, and after victoriously overrunning Syria and Babylonia in spite of the Byzantine emperor Heraclius, died in 634 A.D., and was buried at Medina, near the grave of Mohammed. See KHALIF, MOHAMMED.

Abu Klea, between Korti and Metammeh, within the great bend of the Nile below Khartum. Here, on the 17th January 1885, Sir Herbert Stewart defeated the Mahdi's forces.

Abu'l Faraj (Lat. *Abulfaragius*), called also Barhebræus—as being of Jewish descent—was born at Malatia in 1226, and became distinguished for his knowledge of Syriac, Arabic, and Greek, and of philosophy, theology, and medicine. At the age of twenty he was made a bishop, and as Bishop of Aleppo rose to the highest dignity among the Jacobite Christians next to Patriarch. He died in Persia in 1286. Of his numerous writings, the best known is a *Chronicle* (ed. Bedjan, Paris, 1890) in Syriac, of universal history from Adam down to his own time. Among his theological writings is a commentary on the Syriac version of the Bible. See a work by Göttsberger (Freib. 1900).

Abulfeda, ISMAIL-IBN-ALI, a Moslem prince, known as a writer of history, was born in 1273 at Damascus; and during his youth, distinguished himself in several campaigns against the Christian kingdom founded by the Crusaders. He ruled from 1310 over the principality of Hamat in Syria, as an independent ally of the sultan, was a generous patron of literature and science, and died in 1331. Among several important works in Arabic, his *Annals*, one of the most valuable sources of history for the Saracen empire, has been edited and translated into Latin (5 vols. 1789–94) by Reiske; the earlier part *Historia anteislamica*, by Fleischer (1831). His other great work is his famous *Geography*.

Abu-Qir. See ABOUKIR.

Abushehr. See BUSHIRE.

Abu-Simbel (also *Abousambul* or *Ipsambul*), a place on the left bank of the Nile in Lower Nubia, the site of two very remarkable rock-cut temples of Rameses II., amongst the most perfect specimens of Egyptian architecture. Here there is no exterior and constructed part; the rock out of which they have been excavated rises too near the river. Still the temples have their façade, as richly decorated and as monumental in its character as those of the most sumptuous edifices of Thebes. The colossal statues here, instead of being isolated monoliths, are a part of the façade itself, hewn out of the rock, though still forming part of it. The façade of the smaller temple, that of Hathor, is 88 feet long and 39 feet high. It has six colossal figures, about 32 feet high, of which four represent Rameses, and the other two his wife, Nefert-Ari. The façade of the great temple is larger, being 126 feet long and 93 feet high. The cornice is formed by twenty-two dog-headed figures seated, the fore-paws resting on the knees, each 8 feet high, sculptured in relief, only attached to the mountain by their hinder parts. Below the cornice runs a frieze formed by the dedicatory inscription, engraved deeply in bold hieroglyphics. Above the door is sculptured a colossal figure of Râ, on both sides of which Rameses is represented in the attitude of adoration. Most striking, however, are the four colossal figures of Rameses, two to the right, two to the left of the door. These are the largest figures of Egyptian sculpture, being 66 feet high from the feet to the *pschent* with which

Façade of the Great Temple at Abu-Simbel.
(From a Photograph by Frith.)

the king's head is covered. Rameses is seated, his hands resting on his thighs, in the ordinary posture of royal statues at the entrance to temples. In spite of its enormous proportions, the work is very fine; the face especially is remarkable for an expression of sweetness and of strength in repose. The depth of the smaller temple from the door is 88 feet. The great temple is 180 feet long from its threshold to the innermost part. The first hall is 59 feet long and 55 feet wide. The second and third are less spacious. The fourth, the adytum, consists of three chambers. Everywhere are pictures like those at Luxor and Karnak, representing the battles and the triumphs of Rameses.

Abutilon, a tropical and warm-temperate genus of Malvaceæ, mostly shrubs, without epicalyx. Many are grown in hot-houses for the sake of their flowers.

Aby'dos, (1) a town in Asia Minor, on the narrowest part of the Hellespont, opposite Sestos, celebrated as the place whence Xerxes (q.v.) passed into Europe in 480 B.C.; and in poetry on account of the loves of Hero (q.v.) and Leander.—(2) A ruined city of Upper Egypt, capital during the 1st and 2d dynasties. Here are the remains of the Memnonium and of Seti I.'s temple and tomb of Osiris, with a great reservoir (mentioned by Strabo) and tombs of early kings. See EGYPT (*Religious Monuments*); also *Journal of Egyptian Archæology*, vol. xii. (1926).

Ab'yla. See CEUTA.

Abyssinia, the modern representative of the ancient Ethiopia, by which name it is still officially known, is an interesting country inhabited by a curiously interesting people living in self-sufficient seclusion on the outskirts of the white man's sphere and quite unenvious of his civilisation. From their mountain stronghold they have resisted his aggression and are still content to regard him as merely an interested traveller. Abyssinia, lying between 3° and 15° N. lat., and 33° and 47° E. long., occupies a very mountainous part of the upper basin of the Nile to the south-west of the lower end of the Red Sea, and extends over the watershed towards the Indian Ocean. Its area is about 350,000 sq. m. It consists of a huge table-land in the west with a mean elevation of 7000 feet; a plateau in the south-east; and a stretch of lowland in the north-east. The declivity to the countries bordering on the Red Sea is abrupt; towards the Nile basin it is more gradual, but in the south-west it is again precipitous. The main upland mass has been cut into blocks by the streams, which have worn out ravines of vast depth—as much sometimes as 4000 feet. Isolated mountains, with naked perpendicular sides, present the most singular forms. The Simen Mountains have summits rising to the height of 15,000 feet.

The Abai, which flows through Lake Tana (q.v.), is the upper part of the Blue Nile. The Takazzé, receiving the smaller Atbara, joins the Nile under the name of the Atbara, after a course of about 800 miles. The Mareb flows NW. into Nubia, where it loses itself in the sand, or in time of flood reaches the Atbara. Similarly, the Hawash takes its rise in the province of Shoa, and flowing in a north-easterly direction, loses itself in the region of Lake Arissa. In the south-west are the Akobo, Gelo, and Baro, which later form the Sobat. The chief of the southern lakes are Abai, Stefanie, and Rudolf, the last receiving the Omo River. The Juba and Webi Shebeli both take their rise in Abyssinian Somaliland and flow south-east.

The climate of Abyssinia, notwithstanding its tropical position, is on the whole moderate and pleasant owing to its elevation. The region called the Kollas, with an elevation of 3000 to 4900 feet, has a temperature of 77° to 95°, with a tropical vegetation. The plains of medium elevation (5000 to 8800 feet) have a temperature of 60° to 80°, and are the chief seats of the population. The higher regions, from 8800 to 12,000 feet or over, have usually a day temperature of 48° to 50°, but falling not seldom below freezing. The season of heavy rains is in summer. The annual flooding of the Blue Nile is of great economic importance to Egypt (see NILE). During the rainy season there is snow on the summits in all the higher regions, and above 13,000 feet the snow never melts. In the river valleys and swamps, the heat and moisture are suffocating and pestilential; in the low region towards the Red Sea, the air is glowing hot, and dry.

Abyssinia as a whole is exceedingly fruitful; and its productions are of the most varied nature. The trees include the wild olive, sycamore, juniper, the Natal pine, mimosa, myrrh, &c., while the banana, date-palm, sugar-cane, vine, orange, lemon, cotton, wild indigo, and coffee all flourish. The higher plateaus furnish rich pastures of European grasses, and also oats and barley. The chief industries are the rearing of cattle, goats, and sheep and the cultivation of grain (*teff* or millet, dhurra, wheat, chick-peas, &c.). Two, and in some places three, crops can be raised in one year. The country is still under a feudal system, and the land belongs to the king. Industry is not developed past the stage of weaving and decorative work. Agricultural methods are very primitive. Gold, iron, and salt are worked, and oil is found, but the mineral wealth, believed to be great, is little explored. Among the wild animals the most dreaded is the hyæna; while the elephant and rhinoceros are found in the low grounds, and there are crocodiles and hippopotami in the rivers. Lions, panthers, leopards, many kinds of antelopes, monkeys, and beautiful birds are to be seen. The domestic animals are horses, mules, donkeys, and camels.

The population of Abyssinia, which numbers perhaps about ten millions, consists of various elements, but the nucleus is formed of the Abyssinians proper a brown, well-formed people, belonging to Hamitic-Semitic stock, and believed to be the descendants of immigrants from Arabia. They detest the name *Abyssinia*, derived from their own word *habesh*, 'mixture.' Their own name for themselves is Itiopavian or Ethiopian. The basis of the language is the ancient Ethiopic (see ETHIOPIA) or Ge'ez, a Semitic tongue which is now the sacred language, understood only by the priests. Of the modern dialects, that of Amhara (q.v.), spoken also in Shoa, prevails. Since the beginning of the 16th century, the Gallas, an African people, have taken possession of many districts, and have mixed with the other races so that they are really the predominant stock of Abyssinia. The Danâkil and Somali are savage nomads, but the Gonrage and the Falasha (the latter practising the Jewish religion and said to be of Jewish descent) are industrious and more amenable to civilisation. Slavery and serfdom are widely spread, but a scheme for gradual emancipation was initiated in 1924. Slave-raiding is a capital offence.

The religion of the Abyssinians proper is a debased Christianity; but the Gallas and other alien tribes are mostly Mohammedan, and partly also pagan. Abyssinian Christianity consists entirely in external observances; the people are abjectly superstitious and excessively lax in their morals. They observe many of the rites of their earlier faith Judaism, such as circumcision and the distinction of animals into clean and unclean. The marriage-tie is very loose, and divorce almost a regular procedure. There are numerous fasts and feast-days. Drinking (of beer and mead) is carried to excess. Beef is eaten raw, and, if possible, while yet warm. The church of Abyssinia has kept its connection with the mother-church of Egypt, and with her adopted the Monophysite (q.v.) doctrine; and the metropolitan bishop or abuna continues to be nominated by the Coptic Patriarch (see COPTS). The church is wealthy in lands and monasteries, while the number of priests, monks, deacons, &c. is very great. There are few schools, so that instruction is backward and the bulk of the people illiterate. The chief literature consists in much-prized manuscripts containing legend, tradition, and stories of saints and kings. They are carefully stored in the keeping of the monasteries, but some have been obtained by travellers and brought to Europe. Of considerable interest, too, are the stones found at Axum and in southern Abyssinia, which, by their Himyaritic inscriptions, reveal the early connection with Arabia. At Lalibala in Lasta are eleven churches hewn with great skill and design out of solid rock. They are held to date from the 12th century.

The chief authority is vested in the Crown, aided by a number of provincial governors, who have wide powers in justice, taxation, &c. The legal code, the *Fetha Nagast*, is written in Ge'ez, and is interpreted with the aid of the priests. Punishment is often very severe, and corruption abounds. Revenue is collected in the shape of customs duties,

tithes, labour dues, and payments in kind. The Abyssinians are keen fighters, and the standing army of about 100,000 men is greatly enlarged in time of war by feudal troops and irregulars.

Abyssinia has paid small heed to the development of its resources, its exports (hides, coffee, wax, ivory) and imports (cotton-goods, cutlery, hardware) being of little significance. Commerce is hampered by an oppressive customs system and the Abyssinians' suspicion of new methods, while the foreign capital and enterprise required to develop the country have not been forthcoming in sufficient amounts. Of great service, however, is the railway, in French ownership, which runs from Addis Ababa to Jibuti on the Red Sea, a distance of 495 miles. It was begun in 1896 but not completed till 1917. Telegraph and telephone systems connect the capital with other commercial centres. There are very few properly constructed roads, and only the Baro River is navigable. Some trade is done by caravans (mule, pack-horse, donkey, sometimes camel) plying between Abyssinia and British Somaliland, Kenya, Sudan, and Eritrea. The principal coin used is the Maria Theresa dollar, but barter is widely resorted to. The Bank of Abyssinia, an offshoot of the National Bank of Egypt, was chartered by Menelik in 1905. The chief towns are the capital Addis Ababa (q.v. 60,000) situated in Shoa; Diredawa (30,000) a busy railway town, where customs duties are collected; Harar (40,000); Adowa (5000); and Axum (5000), the ancient capital of Ethiopia.

History.—The native annals of Abyssinia, tracing their kings from Menelik, the son of Solomon by the Queen of Sheba, down to recent times, are manifestly fabulous. It is very probable, however, that there was very early connection between Abyssinia and Egypt and Arabia. The real history begins with the kingdom of Axum (see AXUM, ETHIOPIA). Christianity was introduced in the 4th century by Frumentius (q.v.) who was consecrated Bishop of Abyssinia by the Patriarch of Alexandria. Under the Axumite rulers, Abyssinia attained its greatest extent and prosperity in the 6th century, when it embraced Yemen in Arabia. But by the conquests of the Mohammedans in the following centuries, the frontiers were driven back to the limits of the tableland, and the Abyssinians were cut off from intercourse with the rest of the world. During these struggles the capital was removed from Axum to Gondar, where the monarchs dignified themselves with the title (assumed about the end of the 13th century) of Negusa Nagast za-Itjopja (king of kings of Ethiopia). With the 16th century began the irruptions of the warlike Galla tribes from the interior of the continent, who committed fearful devastations. The search for the kingdom of Prester John (q.v.) brought the Portuguese in contact with Abyssinia in the end of the 15th century, and a number of them under Christoforo da Gama, brother of the famous explorer, aided the Abyssinians in routing the Moslem forces in 1543. With the view of converting the Abyssinians to the Catholic Church an embassy had been sent to the Negus (1520); and at last, about the beginning of the 17th century, the royal family submitted to the Roman Church. The body of the people, however, looked upon it with aversion; and in 1634 the monarch was obliged to resign in favour of his son, who banished or executed the Catholic priests.

The monarchs lost all control over the great chiefs, who set up as independent rulers in their several provinces. At length Michel Sohul, the ruler of Tigré, put the reigning monarch Joas to death (1769); and setting up a member of the royal family as nominal sovereign, exercised at Gondar the powers of sovereignty under the name of *Ras* or prime minister. Ras Michel was soon driven from power by a Galla chief, who acquired the dominion of Amhara and the control of the titular sovereign, and transmitted his power to his son and grandson. The latter, Ras Ali, held sway in Amhara as vicegerent of the empire, when, about 1850, the adventurer Kasa or Kassai began to excite attention. Kassai was a native (born about 1816) of Kuara, a province in the west of Amhara, of which his uncle was governor. After the uncle's death, Kassai, defeating the armies of the Ras, compelled his recognition as governor, and became Ali's son-in-law. In 1853 he crushed the Ras, and two years later, after completely defeating the prince of Tigré, he had himself crowned by the Abuna as Negus of Abyssinia, with the name of Theodore. He then subdued the Wollo Gallas; and having next conquered Shoa, he was now master of the whole of Abyssinia, and with greater power than was ever wielded by a Negus. This was the acme of his fortunes, which henceforth began to decline. From being a prudent and moderate ruler he became cruel and tyrannical. His huge army bore heavily on the resources of the country, and insurrections were suppressed with unheard-of rigour.

Theodore had made several vain attempts to procure the active alliance of England and France against the Mussulman powers. In 1862 he felt himself slighted by these two countries with regard to communications which he addressed to them, and began to maltreat the consuls and their servants, and other Europeans in his dominions. The British Government in 1864 sent envoys to Theodore, but they were also shut up along with the other prisoners in the fortress of Magdala. A British military expedition was now despatched under General (afterwards Lord) Napier, and on the 9th April 1868 they reached Magdala. Theodore had occupied the fort and the following day the Abyssinians rushed down upon a British detachment of 1700 men in the plain below the fort, but their repeated assaults were repulsed with great loss. Theodore sued for peace, and released the prisoners; but as he declined to surrender, the fort was stormed and taken on the 13th. Theodore was found dead—he had shot himself. The fort being demolished, the British forces were entirely withdrawn.

The departure of the British was the signal for a renewed struggle. Kassai of Tigré vanquished his most powerful rival, and had himself crowned Emperor of Abyssinia in 1872, assuming the name of John. He made repeated but vain attempts to get European help against the Egyptians, with whom Abyssinia had been at enmity since 1860. In 1875 there was a bloody but short and indecisive war between the Khedive's forces and the Abyssinians; and frontier difficulties continued until the Sudan was evacuated by Egypt in 1882. In 1885 the Italians occupied Massowah. On the death of John in 1889, Menelik, king of Shoa, became Negus of Abyssinia, and by treaty Italy took over all foreign relations. But Menelik was a restive vassal; and in February 1896 an Italian expedition was utterly defeated by Menelik near Adowa. A treaty of that year acknowledged the complete independence of Abyssinia, and Italy retained only the coast strip. Menelik unified the country internally and concluded a number of treaties with foreign powers. In 1902 the boundary between the Sudan and Abyssinia was agreed upon, another important provision being that Abyssinia should not obstruct the Nile waters by a dam without the consent of the British government. In 1906 Britain, France, and Italy undertook to respect the independence of Abyssinia, and made agreements respecting railways and trade facilities. Agree-

ments concerning the boundary with British Somaliland and East Africa were made in 1897 and 1907. Menelik was a powerful ruler but was latterly incapacitated by paralysis and died in 1913. His grandson, Lidj Yasu, was deposed in 1916, and Menelik's daughter, Zeodita, succeeded, but the ruler of the country is the heir-apparent Ras Tafari Makonnen, Menelik's grand-nephew. Abyssinia entered the League of Nations in 1923.

See BRUCE, and works by Bruce (1790), Salt (1814), Abbadie (1860–90), Portal (1891), Bent (1893), Wylde (1901), Gilmour (1906), Rein (1920), Alype (1925), Rey (1923 and 1927), Forbes (1925), Hodson (1927); articles in the *Geographical Journal*, and the *Journal of the African Society;* and a book by Dowling (1909) on the Abyssinian Church. A part of the *Royal Chronicle* was translated in 1923 by H. W. Blundell, and the chronicles are made use of in Sir E. A. Wallis Budge's *History of Ethiopia* (2 vols. 1927).

Acacia, an important genus of leguminous trees or shrubs, of the sub-family Mimosoideæ, mainly natives of tropical Africa or Australia, frequently thorny, with extraordinary differences in general appearance, owing to the remarkable modifications of the vegetative organs. The normal type of leaf is bipinnate (fig. 1); but is often modified, especially among the species which have had to become adapted to the intense heat and drought of Australia, where they greatly abound, forming 'acacia-scrub.' The leaf-blade entirely ceases to be developed, and the leaf-stalk becomes vertically flattened into a 'phyllode,' which thus resembles a simple leaf, and performs vegetative functions; but, like the leaves of many species of Eucalyptus, presents only its edge to direct sunshine;

Fig. 1.—Acacia (*A. arabica*).

Fig. 2.

Fig. 3.

Fig. 4.

and by its thick and strong epidermis is further adapted to resist transpiration. The line of modification is beautifully indicated by such a species as *Acacia heterophylla* (fig 2), in which, along with the phyllodia, many of the normal bipinnate leaves survive; as also by seedlings (fig. 3), which invariably develop one or two bipinnate leaves after the cotyledons, and usually also show transitional forms to phyllodia, even in species so extremely modified as *Acacia alata*, where even the phyllodial type becomes disguised by the downward continuation of the phyllode into an expanded wing running down the stem, somewhat like the decurrent leaves of a thistle (fig. 4). Many species are also cultivated in our greenhouses for the sake of their flowers, which are united into golden stamen-tufts of great beauty, and are often fragrant. The leaves often exhibit sleep-movements analogous to those which are developed into sensitiveness in some of the allied Mimosas (see SENSITIVE PLANT, SLEEP), and in some species close whenever the sun is clouded. The genus is also of great and varied economic importance, not merely as frequently yielding timber or edible seeds in the regions where they flourish, but as possessing the astringent and gum-yielding properties common in the sub-family in the highest degree. The drug known as Catechu (q.v.) is prepared from *Acacia Catechu;* while of still greater importance are the products yielded by the degeneration of the cell-walls of the inner bark (bast-parenchyma and sieve-tubes). These are known in commerce as Gum-Arabic, Gum-Senegal, &c., and are got from *Acacia arabica*, *Acacia Senegal*, and other species (see GUM). Some species of Robinia (q.v.) are often erroneously called acacia. *Flores Acaciæ* is an old medical name for sloe-flowers.

Academy (Gr. *akadēmeia* or *akadēmia*) was the name of a public park nearly a mile to the NW. of Athens, equipped as a gymnasium by Hipparchus, and bequeathed to the citizens as a pleasure-ground by Cimon, son of Miltiades, who had adorned it with avenues of trees, statues, and altars. In its shady walks (the 'groves of Academe') Plato was wont to converse with his disciples and friends; and so the name of the meeting-place, said to have been originally derived from the hero Academus, came to be used as a distinctive title of Plato's school and of the Platonic philosophy. The various phases of development or perversion which Plato's principles underwent at the hands of a long train of successors are spoken of as the *Old* Academy; the *Second* or *Middle* Academy, led by the disputatious Arcesilaus (q.v.); and the *New* Academy, of which the sceptical Carneades (q.v.) was the head. Occasionally the professedly Platonic system, as taught by Philo and Antiochus respectively, is referred to as the Fourth and Fifth Academies. Cicero's *Quæstiones Academicæ* had their name from one of his villas known as *Academia.* At the revival of classical studies in the 15th century, the name academy came to be given in Italy either to associations of learned men or to educational institutes, and a like divergence still marks the use of the term. In Germany it is generally used of learned societies, is occasionally applied to the universities, and is the recognised denomination of many technical institutes, such as military and naval academies, schools of mining, agriculture, and forestry. In Britain and America academies may be grammar-schools, military and naval educational schools, or associations for the promotion of music and the fine arts. Sometimes 'academy for young gentlemen' is simply an elementary boarding-school. France is divided for educational purposes into seventeen circumscriptions or territorial areas called *académies*, with rectors, academic councils, and inspectors; these together form the University of France. The *Académie* of Geneva is its university. The Grand Opera in Paris is officially, but strangely, termed *Académie Nationale de Musique*, an example followed by several of the

comic theatres. In America (as at New York, &c.) the name Academy of Music is often used of opera-houses.

In its most universal modern acceptation, the word academy denotes a society of learned men, incorporated for the promotion of science, literature, or art. The first institution in ancient times that seems to merit the name, in this sense, of academy was the celebrated *Museum* founded at Alexandria in the 3d century B.C. by Ptolemy Soter, which concentrated in that intellectual capital all that was most eminent in science, philosophy, poetry, and criticism. After this model, the Jews, and at a later period the Arabians, founded numerous institutions for the promotion of learning. In the middle ages, with the exception of the Moorish institutions at Granada and Córdoba, in which poetry and music formed prominent subjects of study, we find nothing corresponding to the modern idea of an academy, save the learned society established by Charlemagne in his own palace, at the suggestion of his teacher Alcuin. In the following centuries there are no traces of any like associations; during the middle ages such learning and science as survived had taken refuge within the monasteries. The academy of the fine arts founded at Florence by Brunetto Latini in 1270, that by Frederick II. at Palermo in 1300, and the *Académie des Jeux floraux* at Toulouse in 1323 existed solely for the culture of poesy. Not till the revival of classical studies in the 15th century did those associations of learned men arise which soon accomplished so much for promoting a freer development of human thought, in opposition to the narrowness of ecclesiastical tradition and monastic practice. The *Academia Platonica* of Florence, established by Lorenzo de' Medici in 1474, devoted itself not only to the investigation of the Platonic philosophy, but to the purification of the Italian tongue and the study of Dante, thus becoming the model of many like institutions in all the more important Italian cities, though it was itself dissolved in 1521. The *Accademia della Crusca*, or *Academia Furfuratorum*, was founded at Florence in 1582; its principal service was the compilation of an excellent dictionary, and the publication of correct editions of the older Italian poets. The Neapolitan *Academia Secretorum Naturæ*, founded in 1560 for the prosecution of the physical sciences, was the first of its kind, but was speedily suppressed by the church. Among the many associations upon its model were the short-lived *Accademia de' Lincei* in Rome (1609), and the *Accademia del Cimento* at Florence (1657). All these and their numerous sister academies in Italy were independent associations, occasionally patronised by princes, but not recognised or formally sanctioned by the state.

A new development was given to such bodies when, in 1635, Richelieu transformed a private association of poets of no great note into a national institution, the *Académie Française*. Its chief object was to give exact rules to the French language, and render it elegant, pure, eloquent, and capable of treating the arts and sciences; and it pledged itself to compose a dictionary, a grammar, and treatises on rhetoric and poetry. The great dictionary, much criticised then and since, was published in 1694, and reached its 7th edition in 1878. A historical dictionary was also undertaken at Voltaire's instigation, but was abandoned (1894) after the publication of 4 vols. devoted to the letter A. The influence of the Academy on the French language and literature has naturally been in the main conservative, and directed on 'taste' rather than on originality. It boasts on its roll of members most of the eminent French writers, though *entre autres* it failed to elect Descartes (who lived abroad), Pascal, Molière (as a player), La Rochefoucauld, and Lesage (who refused nomination), Saint-Simon, Jean Jacques Rousseau, Diderot, Beaumarchais, Honoré de Balzac, Béranger (who also declined), and Zola or any woman writer. Louis XIV. founded the *Académie des Inscriptions* in 1663 for the immediate object of examining his collection of medals and other antiquities. The third academy in order, the *Académie Royale des Sciences*, was founded by Colbert in 1666. The painter Le Brun founded in 1648 an *Académie de Peinture*, for which he obtained a charter in 1655; and in 1664 Colbert remodelled and established it as the *Académie Royale de Peinture et Sculpture*, with which was afterwards incorporated the *Académie Royale d'Architecture*, founded 1671. All these academies were suppressed by an edict of the Convention (1793); but in 1795 the Directory established a great national association, for the promotion of the arts and sciences, called the *Institut National*. It was at first divided into three classes, and rearranged in four in 1803. In 1816 Louis XVIII. restored the names of the old academies to the four classes of the Institute—(1) *L'Académie Française*; (2) *L'Académie des Inscriptions et Belles-lettres*; (3) *L'Académie des Sciences*; (4) *L'Académie des Beaux-arts*, the general title, 'Institut de France,' becoming successively modified by the epithet 'Royal,' 'Impérial,' or 'National,' in harmony with the political changes in France. An ordinance of 1832 re-established the old second class as a fifth academy, *L'Académie des Sciences Morales et Politiques*. Each academy has its own jurisdiction and work; the library and valuable collections of the *Institut* are common to the five. Since 1807 the *Institut* has been housed in what was the Palais Mazarin or Collège des Quatre-Nations. Members are elected by ballot, the election requiring confirmation by government. Members of one academy may belong to any or all of the other four. Every member gets a small annual allowance, and the six permanent secretaries of the five academies (the *Académie des Sciences* has two) receive moderate salaries. Each academy appoints two members to a Central Commission of Administration. The *Académie Française* has a director and a chancellor, changeable every three months. All five academies hold weekly meetings; the *Institut* meets once annually for each academy, and there is a general public session of the whole *Institut* on 25th October, the anniversary day of its foundation. From the outset the number of *fauteuils* (seats) for the 'Immortals' of the *Académie Française* has been limited to forty. The membership of the *Académie des Sciences* is sixty-eight, of the *Académie des Beaux-arts*, forty-one; the others have each forty members. With the exception of the *Académie Française*, each academy has ten *académiciens libres*, a few *associés étrangers*, and numerous *correspondants*; 'académiciens libres' have only the right of attending meetings of the academy; 'associés étrangers' are foreign members. In 1654 a prize for eloquence was founded by bequest of Balzac, and its first award in 1671 inaugurated the laureate system of the *Académie Française*. The *Institut* now administers large funds, and its component parts distribute many prizes for distinction in various fields—e.g. the Montyon (q.v.) prize. The *Académie de Médecine* (created 1820, in place of the Royal Academy of Chirurgy and Royal Society of Medicine, 1731–93) is not part of the *Institut*; its membership is a hundred. The *Académie Goncourt* (ten members), formed in 1903 in terms of the will of Edmond de Goncourt, awards an annual prize to a writer of fiction.

See *L'Institut de France*, by A. Franklin and others (1907); *Le Premier Siècle de l'Institut*, by Comte de Franqueville (1895); and the *Annuaire* of the Institute;

histories of the *Académie Française*, in French, by Pellisson and D'Olivet (1743; reprinted 1858), P. Mesnard (1857), E. Gassier (1906), G. Boissier (1910), and F. Masson (1913), and in English by D. M. Robertson (1910).

Academies after the Parisian model were soon established in most of the other European capitals. Of these several have attained the rank of national central institutions, as those of Madrid, Lisbon, Stockholm, and Leningrad, Centralisation of this kind has never been possible in Italy, Germany, or England, where the advantages and disadvantages of such academies have often been discussed, notably by Matthew Arnold in his essay on the *Literary Influence of Academies*. In 1899 an *International Association of Academies* was founded 'for the preparation and promotion of scientific undertakings of general interest, and to facilitate scientific relations between different countries;' it holds triennial congresses, attended by delegates representing academies and learned societies throughout the world. Whether working with the sanction and support of the state or as independent associations, academies, when not directly modelled after the French Institute, generally fall into two or three main classes or departments, of which one at least interests itself in mathematics and the natural sciences; another is devoted to philosophy, philology, and history. The members, who in many cases receive a salary, are usually classified as *ordinary*, *honorary*, and *corresponding*. They may choose each for himself a special subject of research, or, as in Leningrad, have one assigned to them by the government. The results of their labours in their various departments are reported at the regular periodic sittings, and thereafter published by the academy. These papers are in England generally termed *Transactions* (Lat. *acta*, or *commentarii;* Ital. *atti;* Fr. *mémoires*); shorter papers, reports of the sittings, notices to members, correspondence, and the like appear in the form of a journal, and are commonly known as the *Proceedings* (Fr. *bulletins*, *comptes rendus*). Prizes are customarily established by the academy for work upon new or difficult subjects.

In France numerous learned societies in the provinces bear the name of *Académie*.—Spain possesses the *Real Academia Española*, founded at Madrid in 1713 for the improvement of the Castilian language; an academy of history (1738); and another (1847) for the furtherance of mathematics and natural science (*Real Academia de Ciencias Exactas*).—The Portuguese Academy was founded in 1779. In Italy, besides the already-mentioned *Crusca*, and the *Del Cimento* at Florence, valuable services have been rendered by the Academy of Sciences at Turin, a private association from 1757 till 1783, when it became a royal institute; the academies at Milan (1776, 1859), Venice (1838), Padua (1779), Brescia (1801), and Bologna (1712); the *Società Italiana delle Scienze* at Modena; at Rome the *Accademia degli Arcadi* (1656), the *Accademia de' Nuovi Lincei* (1847); the agricultural *Accademia dei Georgofili* (1752) at Florence; and the Neapolitan *Nuova Società Reale*.

The *Akademie der Wissenschaften* of Berlin was founded in 1700 by Frederick I. The first president was Leibniz. Under the great Frederick, new life was infused into the academy by the encouragement offered to learned men of all countries to settle at Berlin. Maupertuis was now appointed president, and the academy was reorganised under the four classes of Physics, Mathematics, Philosophy, History and Philology. The famous *Gesellschaft der Wissenschaften* at Göttingen has been in existence since 1752. The academy at Munich dates from 1759; that at Leipzig from 1768.—The Austrian *Akademie* at Vienna was instituted in 1847.—Notable also are societies at Prague and Cracow, and the Hungarian academy at Budapest.—In Belgium the *Académie Royale* (1772, 1808) holds the first rank.—The Netherlands have an *Akademie van Wetenschappen* (1808); besides learned societies at Middelburg, Utrecht, Haarlem, and Rotterdam.—The national academy of Denmark has published valuable transactions since 1742.—Norway has had an academy at Trondhjem since 1760, and another in Christiania since 1837. Sweden possesses two academies at Stockholm for the promotion of science and literature, founded respectively in 1739 and 1786; besides the well-known *Regia Societas Scientiarum* of Uppsala.—The Leningrad academy was planned in 1724 by Peter the Great, but founded by Catharine I. in 1728.—Finland has a *Societas Scientiarum*, meeting at Helsingfors.—There are also academies at Belgrade, Bucharest, Constantinople (1851), and Alexandria.

In Great Britain learned associations are most frequently known as Societies (q.v.). The *Royal Society*, the *Royal Society of Edinburgh*, and the *British Association* are treated in separate articles. Except in the case of the *Royal Irish Academy of Sciences* in Dublin (founded 1782), and the *British Academy* for the promotion of historical, philosophical, and philological studies (which received a royal charter in 1902), the name academy is in Britain generally reserved for institutions for the cultivation of the fine arts; see ROYAL ACADEMY. An 'Academic Committee' to consist of forty members was organised in 1910 by the Royal Society of Literature and the Society of Authors; it is designed, like the French Academy, to maintain the purity of the English language, encourage fellowship amongst its members, and arrange 'discourses of reception,' obituary addresses, and the awarding of medals. The *Royal Scottish Academy* of Painting, Sculpture, and Architecture was founded at Edinburgh in 1826, and received a royal charter in 1838. See F. Rinder, *The Royal Scottish Academy, 1826–1916* (1917). Similar to these also is the *Royal Hibernian Academy*, incorporated at Dublin in 1803. The *Royal Academy of Music* in London (1823) is an educational institute.

In America, as in Britain, learned societies are not usually termed academies (e.g. the *Smithsonian Institution* at Washington, q.v., and the *American Philosophical Society* at Philadelphia, 1780), but some are. The *American Academy of Arts and Sciences* was established at Boston in 1780; it had previously existed in another form, the original institution being due to Franklin. The *Academy of Natural Sciences* was founded at Philadelphia in 1812. The *Connecticut Academy of Arts and Sciences* was organised at Newhaven in 1799. The *New York Academy of Sciences* was incorporated in 1818 as the 'Lyceum of Natural History.' The *National Academy* was incorporated by the congress of the United States in 1863, its object being to examine and report upon scientific questions. The *Academy of Science of St Louis*, Missouri, was incorporated in 1857. The *Chicago Academy of Science* (1865) publishes occasional Transactions. The *Academy of Political and Social Science of Philadelphia*, founded in 1889, is notable in its special lines of research. The *Pennsylvania Academy of Fine Arts*, at Philadelphia (1805), affords excellent facilities for instruction. The *National Academy of Design*, in New York, claims to be the foremost school of art in the United States; and the art schools at St Louis, Cincinnati, Chicago, &c. are virtually academies of the fine arts.—Canada has its *Royal Society* (1882); whilst at Rio Janeiro and other South American capitals there are academies of literature, science, and art. Some of the great Military Schools (q.v.) are also called academies—notably West Point (q.v.).

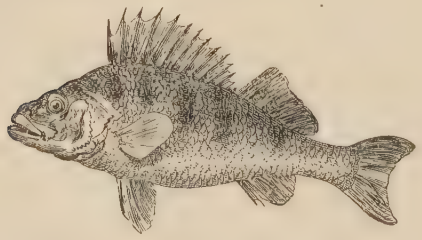
Acadia (*Acadie;* Micmac *Akăde*, 'abundance'), a name given by the French settlers to Nova Scotia (q.v.) on its first settlement in 1604, and ultimately extended to comprise New Brunswick and part of Maine. When a grant of the peninsula was obtained in 1621 by Sir William Alexander, it was named Nova Scotia in the charter. His attempts to colonise the country on a large scale were defeated by the French. The English claimed the colony by right of discovery—as having been discovered by the Cabots; the exclusive possession of the fisheries proved a further bone of contention. In 1667 it was ceded to France; but the English colonists never recognised the cession, and harassed the French settlers. In 1713 France gave up all claim to the colony: the Acadians mostly remained, though they had liberty to leave within two years, and were exempted from bearing arms against their brethren. A French settlement was formed on Cape Breton, and received the name of Louisbourg; whilst as a result of French intrigues with the Indians, the latter harassed the English. The majority of the Acadians would not take the oath of allegiance, nor would they refrain from abetting underhand hostilities against the English. 'The French government,' says Parkman, 'began by making the Acadians its tools, and ended with making them its victims.' Accordingly, in 1755 it was determined at a consultation of the governor and his council to remove them; and to the number of about 18,000, they were dispossessed of their property and dispersed among the other British provinces. This wholesale expatriation, often severely condemned, was not resorted to until every milder resource had been tried. A simple, yet very ignorant peasantry, living apart from the rest of the world, they were ruled by the priest, who taught them to stand fast for the church and King Louis, and to resist heresy and King George. The sufferings of the Acadians form the groundwork of Longfellow's *Evangeline*. See Murdock's *History of Nova Scotia* (1866); Hannay's *History of Acadia* (1879); and Parkman's *Montcalm and Wolfe* (1884).

Acajutla, a small seaport on the west coast of San Salvador, which still has considerable trade, but was formerly much more prosperous.

Acale'phæ (Gr., 'nettles'), a term first applied by Aristotle to the jelly-fish tribe, on account of their stinging powers. At a later period the designation was used by Cuvier and others to include the true medusæ or jelly-fishes, Acraspeda, the Lucernarida, and the Ctenophora (q.v.), while others have given it a still wider application equal to Cœlenterata. The term has now been replaced by a more precise nomenclature. See Cœlenterata, Hydrozoa, and Jelly-fish.

Acanthocephala, a peculiar order of parasitic worms, of cylindrical form, with protrusible hook-bearing proboscis, and without alimentary canal. The order includes a few genera, of which the best known is Echinorhynchus (q.v.).

Acanthopterygii, a term due to Cuvier, and



Perch, an Acanthopterygious Fish.

employed to designate one of the principal orders of bony fishes (see Fishes). Literally meaning thorny-winged (Gr. *acantha*, 'a thorn,' and *pteryx*, 'a wing'), the term describes one of the characteristics of the order—namely, the presence of unjointed spinous rays in the dorsal, anal, and ventral fins. Among the common representatives are perch, mullet, mackerel, miller's thumb, gurnard, blenny, and stickleback.

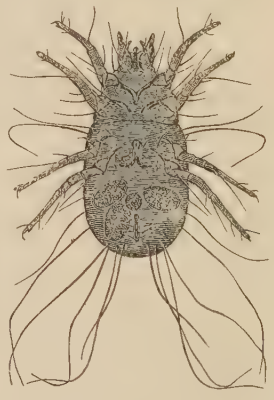
Acanthus, the name given by the Greeks and Romans to the plants sometimes also called Brancursine, and adopted by Linnæus as the generic name. *Acanthus spinosus* and *Acanthus mollis*, natives of the south of Europe, are the species best known, and are of considerable interest as having been more largely conventionalised in

Acanthus spinosus, natural. Ornamental Acanthus Leaf.

sculpture and decoration than any other plant. *Acanthus mollis* is said to have furnished to Callimachus the idea of the Corinthian capital. The adherence to this form is simply traditional, since numberless other plants lend themselves equally well to the purposes of the designer. The genus is the type of the Acanthaceæ, sympetalous dicotyledons allied to Scrophulariaceæ, chiefly tropical. Some anchor their seeds by mucilaginous hairs; some eject them explosively. Most are mere weeds, but several are valued hothouse flowers.

Acapulco, the best Mexican harbour on the Pacific, situated about 180 miles SW. of the capital. The harbour is so well sheltered that vessels may ride safely at anchor close to the granite rocks. But the shelter of the mountains makes the climate hot and unhealthy, and earthquakes (as in 1909) are not infrequent. Pop. about 6000, mostly Indian half-breeds.

Acari'na, or mites, in the wide sense, form a low order of Arachnida (q.v.). Most of them are extremely small, the body is all one piece, the mouth parts are modified for sucking or biting, and the organs are generally simple and often degenerate. There are usually four pairs of legs, but these are often reduced. They are very prolific, and they always show some metamorphosis. Of universal distribution, they occur especially where food is abundant—e.g. in decaying animal and vegetable matter, or within and upon other organisms. Many of them form galls on plants. The Cheese-mite (q.v.), the Sugar-mite, the Itch-mite (see Itch), the common Harvest-mite (q.v.), the frequent parasite on the human nose (*Acarus folliculorum*, q.v.), the abundant ticks, the water-mites on water-beetles, &c.,



Cheese-mite.

the familiar 'red spider' of hothouses, are exceedingly frequent forms. An East-Indian harvest-mite (*Trombidium tinctorum*) yields a dye. In their destruction of decaying organic matter, mites doubtless act as beneficial scavengers. Some acarina—e.g. ticks—disseminate the germs of disease, such as Texas fever in cattle. As abundant and troublesome parasites they are of some importance.

Acarnan, one of the Epigoni, son of Alcmæon (q.v.) and Callirrhoe, with his brother Amphoterus avenged his father's death. He was reputed to be the founder of the state of Acarnania.

Acarnania, a north-westerly part of ancient Greece, separated from Epirus on the N. by the Ambracian Gulf, now the Gulf of Arta; from Ætolia on the E. by the river Acheloüs; and washed S. and W. by the Ionian Sea. Its inhabitants were brave, but rude and addicted to piracy and robbery. Along with Ætolia, it now forms one of the provinces of Greece. The western part of Acarnania is occupied by a mass of rocky and thickly-wooded mountains rising abruptly from the indented coast. Among the inhabitants, besides the Greeks, are bands of nomadic Kutzo-Wallachs called *Karagunis* ('black-cloaks'), who descend from the mountains at the approach of winter, and squat with their herds at the edge of the woods. The chief town of the nome is Missolonghi in Ætolia.

Ac'arus folliculorum, or DEMODEX FOLLICULORUM, is a microscopic parasite allied to the mites, which inhabits the hair-follicles and sebaceous glands of the human skin, also the wax of the ear. It is found most commonly in the skin of the nose, and is present in a large proportion of healthy individuals, but is of no practical importance. It may be seen when present by squeezing out the contents of a sebaceous follicle, mixing with a little oil on a glass slide, and examining under the microscope. It is from $\frac{1}{50}$ to $\frac{1}{100}$ inch in length. The thorax occupies from $\frac{1}{5}$ to $\frac{2}{5}$ of its length, and is furnished with four pairs of rudimentary limbs. See PARASITIC ANIMALS.

Acarus folliculorum.

Acca. See ACRE (ST JEAN D').

Accad, or AKKAD, was the northern division of ancient Babylonia, as distinguished from Sumer, the southern. The Accadians were the dominant people in Babylonia at the time of the earliest records, though they seem originally to have come from the west or north-west. They were probably a Semitic, or partly Semitic, people; whereas the native stock of Sumer (Biblical Shinar), the southern division of Babylonia, spoke an agglutinative tongue, perhaps with Ural-Altaic affinities. There was also a city of Accad. See BABYLONIA; and King's *Sumer and Akkad* (1910).

Acceleration is a term used in the science of Kinematics (q.v.). If a point be moving with variable velocity, its motion is said to be *accelerated*, and the rate of change of velocity is termed its *acceleration*.—For the acceleration of the moon, see MOON.

Accent, in Language, is a special stress of voice laid upon one syllable of a word, by which it is made more prominent than the rest; every word in English has one syllable thus brought markedly into notice. The accented syllable is sometimes indicated by a mark, as *away'*, *for'tify*. When the accented syllable falls near the end of a long word, there may be one or more secondary accents, as in *rec'ommend''*, *subor'dina''tion*. Accent depends upon force of vocal or articulative effort, not upon highness or lowness of pitch. In English, many nouns are converted into verbs simply by transposing the accent, as *ob'ject—object'*. It is accent alone, and not quantity, that determines English measures or metres in versification. No rule can be given as to what syllable of a word shall be accented. There is a strong tendency in our language to throw the accent towards the beginning of words.—*Emphasis* is to sentences what accent is to words; it is a stress laid upon some one word or part of a sentence to make it prominent. If accent is syllabic emphasis, emphasis is logical accent.

Accent, in Music, is analogous with accent in poetry. It is one of the elementary requisites of musical art, that in a series of notes, an emphasis or accent should recur with mostly unbroken regularity. The position of this is generally indicated by bars across the stave, the accent being normally on the first note within the measure. A secondary or weaker accent is sometimes placed on the third beat, whether in common or triple time. More frequently than in poetry, the accent is, for the sake of effect, transferred from its normal place (see SYNCOPATION). What is called by some writers the *rhetorical* accent, is the proper adaptation of the accent in vocal music to that of the words. *Accents*, in liturgical services, are the forms of intonation of various portions in definite musical rhythm.

Acceptance of a bill is the signification by the drawee of his assent to the order of the drawer. It must be written on the bill and be signed by the drawee. The signature of the drawee, without additional words, suffices. The acceptance may be before the bill has been signed by the drawer, or when it is overdue, or after having been dishonoured. Acceptance is either general—i.e. assenting, without qualification, to the order of the drawer—or qualified—i.e. expressly varying the effect of the bill as drawn. A qualified acceptance may be conditional, or partial in amount, or local—i.e. restricting the place of payment; or qualified as to time; or by one or more drawees, but not by all. The holder of a bill may refuse to take a qualified acceptance. See BILL OF EXCHANGE.

Acceptance is also a term in the law of contract. A contract involves an offer, express or implied, by one party, and an acceptance by the other. It depends on the character of the offer whether an express acceptance is required, or whether a tacit acceptance by acting on the offer is sufficient to complete the contract. The acceptance must meet the offer; otherwise it does not make a contract, but is merely a counter-offer. Acceptance must be within the time fixed by the offer; or, if the offer does not specify any period for acceptance, the acceptance must be within a reasonable time. When the offer is made by letter, the contract is concluded as soon as an acceptance is posted. See CONTRACT.

In the United States the acceptance of an offer concludes a contract, and the rules are similar to those in England. An acceptance of a bill may be *absolute*, when it is a positive engagement to pay the bill according to its tenor; *conditional*, when it is an undertaking to pay the bill on a contingency; *express*, when it is an undertaking, in express and direct terms, to pay the bill; *implied*, when the undertaking to pay the bill is inferred from acts of a character to warrant such an inference; *partial*, when the undertaking varies from the tenor of the bill; and *qualified*, when the acceptance is either conditional or partial.

Acceptilation (Lat. *acceptilatio*) was, in Roman law, a formal mode of extinguishing an

obligation. It was effectual whether payment had or had not been received. It was primarily applicable only to debts contracted by stipulation; but, in the later Roman law, any kind of obligation could be converted into an obligation constituted by stipulation, and so become capable of being extinguished by acceptilation. The term has been adopted in Scots law to denote the gratuitous release of a debtor from his obligation. By an obvious transference, the word was used in dogmatic theology for the doctrine laid down by Duns Scotus, and defended by Arminians, that the satisfaction rendered by Christ was not in itself really a true or full equivalent, but was merely accepted by God, through gracious good-will, as sufficient.

Ac'cessary, or ACCESSORY. In the criminal law of England, an accessary is a person who is not the chief actor in a felony, nor even present at its perpetration, but who is in some way concerned, either *before* or *after* the fact. An accessary *before* the fact is one who procures or counsels or commands another to commit a crime, he himself being absent. But mere knowledge that a crime is to be committed is not enough to constitute an accessary; there must be active instigation or counsel given. An accessary *after* the fact is a person who, knowing a felony to have been committed, receives, protects, or assists the felon; but merely suffering the principal to escape is not enough. In unpremeditated offences, there can obviously be no accessaries *before* the fact; in all crimes under the degree of *felony* there are no accessaries at all, but all persons concerned are held to be guilty as principals. There are no accessaries in treason, but all are principals, on account of the heinousness of the crime. Accessaries must be distinguished from principals in the second degree, who are present aiding and abetting, and generally receive the same punishment as principals.

In the Scottish law, 'art and part' is the equivalent to accessary, but it also includes principals in the second degree. No distinction is made between guilt by commission and guilt by accession; but, except in treason, accession after the crime is not recognised in Scotland. The most common form of it is, however, prosecuted under the name of reset of theft.

In the United States, the common law distinction between principals and accessaries has been abolished by statute, and every person concerned in the commission of a crime, whether he directly commits the act constituting the offence, or aids and abets in its commission, is a principal.

Accession. In the law both of England and Scotland, property may be acquired by accession, and this accession may be either natural or artificial. The young of cattle and other animals, for example, belong to the person who is the owner of the mother, and the fruits and produce of the earth to the proprietor of the soil; and for the same reason, the gradual addition to lands on the bank of a river belongs to the proprietor of the land receiving the addition. These are instances of *natural* accession. Property, again, is acquired by *artificial* accession when the original subject of ownership is improved by human industry; thus trees planted, or buildings erected, on the ground of another belong to the owner of the ground itself, and not to the planter or builder.

In the United States, accession is the right to all which one's own property produces; the right to that which is united to it, naturally or artificially, by accretion. If the materials of one person are united by labour to the materials of another, so as to form a single article, the property in the joint product is, in the absence of any agreement, in the owner of the principal part of the materials by accession. If there be a sale, mortgage, or pledge of a chattel, carried into effect by delivery, and other materials are added afterwards by the labour of the vendor or mortgager, these pass by accession.

Accession to Trust Deed. This, in Scots law, denotes the act of a creditor, by which he consents to the distribution of his debtor's estate under a private trust deed granted by the debtor for the purpose. It is in the option of a creditor to consent, or refuse consent, to such a deed. Accession by a creditor, having the effect of barring him from carrying out measures inimical to the trust deed, may be inferred from his actings. A non-acceding creditor may at any time apply for sequestration. See BANKRUPTCY.

Accidence is the part of Grammar (q.v.) which treats of the inflection of words.

Accident. See INSURANCE, FACTORY ACTS, MASTER AND SERVANT.

Accidental Colours are the imaginary complementary colours (not caused by light, but due to subjective sensation; see COLOUR) which are seen when, after looking fixedly at a bright-coloured object, the eye is turned to a white or light-coloured surface. If the object was red, the accidental colour will be green. Blue corresponds in like manner to yellow.

Accidentals, in Music, are signs of chromatic alteration of the notes, differing from the Signature (q.v.) in commonly affecting only the note to which they are applied and any other notes on the same line or space in the same bar. Accidentals indicate a temporary change of key. They are five in number; the sharp (♯), the double sharp (×), which raise the note to which they are prefixed a semitone and a tone respectively; the flat (♭) and the double flat (𝄫), which lower it correspondingly; and the natural (♮), which annuls the effect of a preceding flat or sharp, whether accidental or in the signature.

Accidents, in Logic or Philosophy, are opposed to Essentials, or to Substance. An accident is a property of an object which may be modified, or even be altogether abstracted, in thought or reality, without the object ceasing to be essentially what it is. For the relation of accident to substance, and of attribute to species, see PREDICABLES, SUBSTANCE.

Accip'itrés, a term applied by Linnæus to birds of prey, such as the hawk (Accipiter). The order is now called Falconiformes, and includes eagles, hawks, vultures, and falcons.

Acclimatisation is that process whereby animals or plants become adapted to, and so thrive in a climate different from that in which they are indigenous. The process, of course, varies widely, according to the amount of difference between the old and the new climate. In cases where the difference is extreme, important changes take place in the constitution, and are often attended with certain diseases described as 'diseases of acclimatisation.' Thus, Europeans settling in tropical parts are liable to disease of the liver; while natives of tropical lands, when resident in England, are exposed to pulmonary disease. The power of bearing changes of climate is greatest in the Anglo-German race, and usually bears a direct ratio to the intellectual development of a race. Some regions have, however, as yet baffled European colonisation. Civilised people display greater ingenuity and strength of will than savages in accommodating themselves to changes of climate, by making careful corresponding changes in their mode of life. Ulloa and Humboldt assert that persons of and above middle age best stand transportation to tropical

climates. Among animals, we find great powers of adaptation to various climates in the horse, dog, cat, and rat; and among plants, in the various cereals, in potatoes, and in several weeds common to almost all climates; but there seems to be a limit to the power, at least as seen in the individual. Acclimatisation beyond a certain point is the work of some generations. Almost all the domestic animals now commonly spread over Europe, and even in high northern latitudes, were originally natives of warm climates. The change produced by the acclimatising of animals may be either an improvement or a deterioration; of the latter, we have an instance in the Shetland pony; of the former, we see an example in the merino sheep of Spain. The reindeer may serve as an instance of the want of the faculty of becoming acclimatised; removed from the cold north to the fertile valleys of a temperate clime, it degenerates and dies. On the other hand, the horse, which is native in the East, arrives at its highest development in England; and the Syrian sheep, brought northward as far as Spain, becomes remarkable for its fine fleece. Spain has a climate much warmer than that of Silesia and Pomerania; and yet the merino sheep bred in these countries have become superior to their ancestors imported from Spain. This is a proof that art may do very much in modifying the influences of climate. Silkworms, brought from China first into Italy, have been acclimatised not only in the south of France, but even on the coast of the Baltic. Recently, attempts have been made to acclimatise in France the llama, the vicuña, and the alpaca of Peru, and with some success in the last instance, as alpacas have been found to thrive pretty well in the Pyrenees.

In America, some interesting experiments in naturalisation have been made. Many European birds have been set at liberty by local societies, and a few species promise to become Americanised. The camel breeds well in a half wild state in Nevada and Arizona; while alpacas, though repeatedly tried, have nowhere thriven. Ostrich-farming was taken up with zeal in Argentina, and soon passed the experimental stage in Arizona and southern California. Australian eucalypts have been successfully introduced on the Roman Campagna; and the Australian wattle (Acacia) thrives wonderfully on the previously bare plateaux of the Cape and Natal. The tea-plant grows well in various parts of the United States. The camel does well in Australia, and has been found highly useful in the desert tracts. Several species of trout, salmon, and other fishes have been successfully naturalised in Australasia, notably in Tasmania and New Zealand. America and Australia alike have become the abodes of many noxious weeds from Europe. The English sparrow is a great nuisance in North America; the English rabbit is extremely destructive in Australia and New Zealand. In like manner, the *Anacharis canadensis*, a harmless water-plant in America, has proved an annoying obstruction in many British canals. On the other hand, in the island of Arran and elsewhere interesting and successful experiments in acclimatisation, especially of Australian plants, have been made. In the case of one species, Eucalyptus or gum-tree, the rate of growth has been even greater than in Australia. The introduction of coffee into the West Indies and of cinchona into India offer further examples of successful acclimatisation. It has been very generally believed that plants may become gradually inured to a climate so different from that to which they have been accustomed, that if they had been at once transferred to it they would have perished. On the other hand, it is maintained that each species of plant has certain limits of temperature within which it will succeed, and that alleged instances of acclimatising have been merely instances of plants formerly supposed to be more delicate than they really were. But as it is certain that different varieties of the same species are often more and less hardy, it would seem that in the production of new varieties by seed, there is still a prospect of the acclimatising, to a certain extent, of species of which the existing varieties are too delicate to grow well in the open air. Of Acclimatisation Societies, the best known is the Paris *Société d'Acclimatation*. The progress which has been made during the past few years in the science of medicine and in sanitation, renders it more probable that attempts made by Europeans to become acclimatised in tropical countries will be successful.

Biologically considered, acclimatisation is part of the general process of modification of organism by environment. When the conditions in the new home are approximately similar, no fresh changes will be imprinted on the organism, and the survival of the imported form is obviously natural. Such cases are instances simply of dispersion, generally by human selection, and hardly of acclimatisation in the strict sense. At the other extreme, the sum of the external forces, or 'natural selection,' may be predominantly adverse, the consequent changes pathological, the result non-survival. The term acclimatisation should thus be restricted to cases between these two extremes, where the plastic organism becomes actively and passively adapted to the new environment. That modifications do take place in consequence of a change of climate and other external conditions, has been recognised from the time of Hippocrates, but how soon these may become really hereditary is still matter of dispute. See CLIMATE, GEOGRAPHICAL DISTRIBUTION, DOMESTICATION, ENVIRONMENT, HEREDITY, PISCICULTURE; Darwin's *Animals and Plants under Domestication*; works on anthropology by Tylor and Waitz; H. Weber's *Climatic Therapeutics*.

Accolade, an essential part of the ceremony by which knighthood was and is conferred. Originally, the grand-master of the order, in receiving the neophyte, embraced him by folding the arms round the neck (*ad collum*). Later, a blow was given with the fist or the flat of a sword (perhaps as the last the knight should suffer to pass unavenged). Now, the sovereign gives the accolade by laying a drawn sword on the shoulders of the kneeling knight-elect, and bids him rise, addressing him with 'Sir' prefixed to his Christian name. See KNIGHTHOOD.

Accommodation, a name given in theological phraseology to a method in Scripture interpretation which explains the form as not necessarily more than the vehicle by which divine and spiritual truth is conveyed to the human understanding. Without such an adaptation, the divine revelation would not be intelligible to man, and thus much of the symbolic method, especially of the Old Testament, is merely a compromise with human weakness. The method of Jesus, in his teaching, is also claimed as an example of accommodation, in his selection of familiar natural phenomena and ordinary human experiences, as the means of conveying to the mind abstract spiritual truths. The secondary fulfilments of prophecy, and the New Testament explanations of the manner in which these were seen in the life of Jesus, are supposed by some to be accommodations.

Accommodation, in Vision. See EYE, VISION.

Accommodation, in Commerce, is either a loan of money directly, or the service rendered when one becomes security for a sum advanced to

another by a third party, as by a banker. For Accommodation Bill, see BILL.

Accompaniment, in Music, is the assisting or aiding of a solo part by other parts, which may consist of a whole orchestra, or a single instrument, or even subservient vocal parts. It is either *ad libitum*, when it may be omitted at pleasure, or *obbligato*, when it forms an integral part of the composition. It serves to support and beautify the solo part, and therefore should not predominate, but merely assist to place the solo part in its brightest light. In this point of view, modern composers have often erred by making the accompaniment too full, and causing it to stand out so independent, that the solo part is often, as it were, entirely lost. This abuse takes place mostly in vocal music; and not only is the effect destroyed, but the vocal organ of the singer is frequently ruined. This is a result, though not a necessary one, of an increasing aim towards a polyphonic style, in which the parts are all of nearly equal value and importance; and it is undoubtedly in this style that the greatest music has been written. The works of Richard Wagner are notable as containing many passages in which the voice is overwhelmed by the orchestral accompaniment, and but few singers have ever been able to cope with this difficulty. The operas of Mozart may probably be regarded as striking the balance most happily on this point. In accompaniment, the composer should keep three principal points in view—harmony, rhythmical figure, and suitable choice of instrumentation, in respect to volume and character of tone; but all must be subservient to the ruling character of the solo part. The accompaniment should, above all things, by its certainty and firmness, prevent wavering. Good accompaniment is as creditable as solo playing; and all qualified orchestras view it as of great importance. In the scores of the older masters, especially Bach and Handel, frequently very faint indications are given of the parts of the accompaniment beyond a *figured bass*—i.e. the bass part with certain recognised figures written above it—indicating the harmony to be played to each note. At that time, the art of playing from this was in general practice among musicians; but it is now necessary to have these parts written out. The work of supplying *additional accompaniments* to these scores, adapted for the modern orchestra, has been performed by numerous eminent musicians, Mozart, Mendelssohn, Franz, and others.

Accomplice. See APPROVER.

Accoramboni, VITTORIA, a beautiful Roman lady whose story gives the plot to Webster's tragedy, *The White Devil*. She was given in marriage to Peretti, a nephew of Cardinal Peretti, afterwards Sixtus V. (q.v.). After her husband's murder by her brother, she became the wife of the Duke of Bracciano, and was ultimately murdered by a nephew of her last husband at Padua in 1585. See a book by Gnoli (1870).

Accordion, a musical instrument invented in 1829 by Damian, of Vienna. It consists of a small hand-bellows, with a keyboard on one side, containing from five to fifty keys, acting on free metal reeds, so arranged that each sounds two notes, the one in expanding, and the other in contracting, the bellows. Its capabilities are extremely limited. See CONCERTINA, HARMONIUM, MELODEON.

Account, in Law, means a statement of money transactions showing a balance due by one party to another, or it may show only goods supplied or services rendered by one party, in respect of which money is due to the other. An account is 'open' or 'current' where the balance is not struck or is not accepted by all the parties. In England, where the parties have agreed to the balance, this is called an 'account stated.' In Scotland a 'fitted account' is entitled to the privileges of a document *in re mercatoria*—i.e. it does not require to be signed before witnesses. It is often stipulated, as in the case of a cash-credit, or of a bank and its agent, that an account stated by the official of the bank shall be conclusive, but this affords only a *primâ facie* case. Even where accounts have been docketed, errors of calculation can be corrected, and if the settlement has been obtained by misrepresentation or concealment, it may be set aside. There is in Scotland a triennial prescription of tradesmen's accounts (see PRESCRIPTION). In Scotland the Accountant of Court is an important officer who has a general supervision of the statutory accounts lodged in sequestrations, cessios, judicial factories, and testamentary trusts, and also of moneys consigned in court.—For accounts in the wider sense, see BOOK-KEEPING, BANKING, PRESCRIPTION, STOCK-EXCHANGE.—Account Duty, a duty on gifts made by a deceased person within three years of his death has, since the fiscal legislation of 1881–1910, become an important branch of public revenue; see DEATH DUTIES, EXECUTOR.

Accountant is a term given in the United States to any one who keeps accounts, to bookkeepers in general; more specially to those who deal with accounts of more than ordinary complexity. In England Accomptants and Auditors of Accompts represented as early as the 16th and 17th centuries what was substantially a distinct profession, whose development is recorded in a *History of Accounting and Accountants* by Richard Brown (1905). Most public companies, such as banks and railway companies, have an officer called an accountant, whose duty it is to take charge of the books and accounts of the concern, and to make up periodical statements and balance-sheets. It is only in recent years that the profession of an accountant has come to be recognised as a special branch of business, its functions having been usually performed, as they still sometimes are, by lawyers and agents. The business of an accountant cannot well be very strictly defined, but it may be stated generally as falling under two divisions: (1) the management or realisation of estates, whether of bankrupts or others; and (2) all matters involving the investigation of business books, as auditing the books of private firms or public companies, and making up balance-sheets, statements of all kinds, and reports. There are several societies of accountants incorporated by royal charter, and a member or fellow of one of these is termed a chartered accountant (C.A. or F.C.A.). The principal society in England is 'The Institute of Chartered Accountants in England and Wales,' incorporated in 1880; and in Scotland there are chartered institutes in Edinburgh (1854), Glasgow (1855), and Aberdeen (1867).

Accra', capital of the Gold Coast Colony, and most important town on the coast, lies slightly to the W. of the long. of Greenwich. It is a healthy place, much attention being paid to the drainage and water-supply, and has considerable export trade in palm-oil, ivory, gold, india-rubber, cocoa, &c. The town has a wireless station, and telegraphic communication with neighbouring countries and England; and a college was opened at Achimota in 1927. Pop. about 38,000.

Accrington, a manufacturing town of Lancashire, a municipal (1878) and parliamentary (1918) borough. It lies in a deep valley, surrounded by hills, 22 miles N. of Manchester, and 5½ miles E. of Blackburn. The oldest church dates from 1554, and was rebuilt in 1763. The town-hall (1857) is a handsome building, and there is a neat market-hall.

It is a great centre of calico-printing, cotton-spinning, the making of cotton machinery; other industries are dyeing, chemical-works, and iron-founding, with coal-mining in the neighbourhood. Pop. (1841) 8719; (1901) 43,095; (1911) 45,029; (1921) 43,610.

Accum, FRIEDRICH, born in Westphalia in 1769, came to London in 1803. He is known in this country chiefly on account of his *Practical Treatise on Gas-light*, and other chemical works. He greatly promoted the introduction of gas-lighting. In 1822 he became a professor in a technical institute in Berlin, where he died in 1838.

Accumulation is a legal term applied to the putting by of interest, or rents, and converting them into capital by investment, of which the income is again capitalised. Restrictions upon accumulation are enforced by the rules against Perpetuities (q.v.) and by the Accumulations Acts of 1799 (see THELLUSSON ACT) and 1892. By the Thellusson Act it is forbidden to accumulate income for a longer period than the life of the truster or settlor, and twenty-one years thereafter. This act applies to movable estate in England and Scotland, and by the Rutherfurd Act, 1848, the prohibition was extended to the rents of land in Scotland. If the direction is given to accumulate for a longer period, the settlement is not void, but is given effect to so far as permitted by law. Accumulation is also applied in Scotland to the charging of compound interest. Such accumulation is permitted on bankers' accounts overdrawn, in certain cases of fixed commercial usage, or where there has been an abuse in a party trusted with funds and violating his trust. See INTEREST.

Accumulator. In such pieces of hydraulic apparatus as hydraulic cranes or hoists, unless the height of the available column of water, or head-pressure, as it is called, is considerable, the necessary amount and constancy of pressure is obtained by means of an accumulator. This usually consists of a dead weight acting by means of a plunger on the water column. Sometimes, however, steam is used to put on the required pressure, in which case the arrangement is called a steam accumulator.—In Electricity, the accumulator is an arrangement by which electrical energy can be stored for a considerable time in some potential form, so as to be used at will for the production of electric currents. See ELECTRICITY.

Acel'dama (Chaldee, 'field of blood'), the name given to the potter's field bought by the priests, as a burial-place for strangers, with the money which Judas had received for betraying Jesus, and which, in the horror of his repentance, he flung at their feet before hanging himself.

Aceph'ala (Gr., 'headless'), a term used from the time of Aristotle in reference to the class of bivalve molluscs or Lamellibranchs (see BIVALVES), has in the main retained its application, though some forms which it once included, such as the sea squirts in Cuvier's classification, have been removed to other divisions.

Acer and **Aceraceæ.** See MAPLE.

Acerra, an ancient city of Southern Italy, 9 miles NE. of Naples by rail. It has a cathedral (rebuilt after the earthquake of 1788), a sulphurous mineral well, and 18,000 inhabitants.

Acetanilide. See ANTIFEBRIN.

Acetic Acid, $CH_3{\cdot}COOH$, the sour principle in vinegar, is the most common of the vegetable acids. It occurs in nature in the essences of some plants, and is formed as a decomposition product of organic matter. It is prepared on the commercial scale by the destructive distillation of wood. A brown distillate—pyroligneous acid—is obtained, containing methyl alcohol, acetic acid, acetone, and some impurities. After several chemical processes, commercial acetic acid is obtained from it. Glacial acetic acid is the pure acid, and is got by the distillation of anhydrous sodium acetate with sulphuric acid. It is a colourless crystalline solid, melts at 16·5° C., boils at 118° C., and has a pungent smell. Acetic acid is readily obtained by the oxidation of alcohol, by exposing a large surface of dilute alcohol to the air. Fermentation soon sets in, due to a minute ferment—*Mycoderma aceti*—which is present in the atmosphere. This ferment gets into the solution, grows and multiplies, and by its presence causes oxidation of the alcohol to acid. The ferment acts as a catalyser. The dilute acetic acid formed is Vinegar (q.v.). The change is accompanied by the absorption of oxygen, one atom of which combines with two of hydrogen to form water, aldehyde being left. Further oxidation then takes place, acetic acid being formed thus:

Alcohol. Aldehyde. Water.
$$2C_2H_6O + O_2 = 2C_2H_4O + 2H_2O$$

Aldehyde. Acetic Acid.
$$2C_2H_4O + O_2 = 2C_2H_4O_2.$$

From the mode in which acetic acid combines with bases to form salts, it is evident that one atom of the hydrogen differs from the other atoms in being replaceable by a metal or an alkyl radical (as ethyl, C_2H_5), and on this account acetic acid is called a monatomic acid, and its formula is usually represented as $HC_2H_3O_2$; that of acetate of potash being $KC_2H_3O_2$, and of acetate of ethyl, $C_2H_5C_2H_3O_2$. A striking experiment may be made illustrating the mode in which alcohol is converted into acetic acid. If slightly diluted alcohol be dropped upon platinum-black, the oxygen condensed in that substance acts with great energy on the spirit, and acetic acid is evolved in vapour. Here the whole office of the platinum is to determine the oxygen of the air and the hydrogen of the alcohol to unite. In the commercial processes for manufacturing vinegar, a ferment or enzyme takes the place of the platinum-black, and determines the same change. The anhydride of acetic acid (see ANHYDRIDES) is formed by the action of chloride of acetyl on acetate of potassium. It has the composition $(C_2H_3O)_2O$, and unites with water to form acetic acid. The salts of acetic acid, called ACETATES, are numerous and important in the arts. Calcium acetate is used in the preparation of acetone. Lead acetate or sugar of lead is important (see LEAD). Iron and aluminium acetates are used as mordants for dyeing, on account of their property of being precipitated as insoluble salts by heat. Acetic acid is used chiefly for the preparation of acetates and organic dyes, and also to a slight extent in medicine.

Acetone, $CH_3{\cdot}CO{\cdot}CH_3$, or dimethyl ketone, is the lowest member of the ketones, commercially prepared by the distillation of calcium acetate. It may also be obtained from the destructive distillation of wood, being separated from wood spirit by distilling over calcium chloride. It is a limpid liquid, having a taste like that of peppermint, and is readily soluble in alcohol, ether, and water. Its specific gravity is about ·79, its boiling-point being 56° C. It is largely used for the manufacture of chloroform, which is obtained from it by distillation with bleaching-powder; also in making iodoform and cordite. It is a solvent for gums and resins.

KETONES are a group which have all the same characteristic grouping, namely, a carboxyl (CO) united to two carbon atoms—e.g. $C_6H_5{\cdot}CO{\cdot}C_6H_5$. They are the aldehydes of secondary alcohols (see ALCOHOL). Acetone is typical, and is obtained by

the oxidation of secondary propyl alcohol, two atoms of hydrogen being removed.

Secondary Propyl Alcohol. Acetone.

$$CH_3{\cdot}CHOH{\cdot}CH_3 = CH_3{\cdot}CO{\cdot}CH_3 + H_2.$$

A'cetyl, or ACYL, is an organic radical supposed to exist in acetic acid and its derivatives; the rational formula for acetic acid being on this hypothesis $(CH_3{\cdot}CO)OH$.

Acetylene, a powerful illuminant, first made on a commercial scale in 1895, is a colourless, heavy gas, with an unpleasant odour. It has the formula C_2H_2, and is the lowest compound of carbon and hydrogen. The exceptional brilliancy of the flame is due to the high percentage of carbon, and on this account burners with very fine holes must be used to avoid sooting up. It can be obtained in a fairly pure state by heating ethelene dibromide with alcoholic caustic potash:

$$C_2H_4Br_2 = 2HBr + C_2H_2.$$

It is interesting chemically, as it can be prepared synthetically by the union of its elements, hydrogen being passed through an electric arc between carbon electrodes. On the commercial scale it is obtained from carbide of calcium. The action of water on carbide forms acetylene and lime:

$$CaC_2 + 2H_2O = C_2H_2 + Ca(OH)_2.$$

Acetylene is in general use as an illuminant for country houses, motor-cars, bicycles, &c., for the reason that the generating plant is compact and simple. Generators are all of similar construction. The carbide is contained in one compartment and water in another. The water drips slowly on to the carbide, the flow being regulated by the amount of gas consumed. The gas passes away through a purifier, and thence to the burner. The waste lime collects at the bottom, and must be removed before recharging with carbide. Acetylene when mixed with air is explosive. With copper it forms an acetylide, which is violently explosive in a dry state. Care must therefore be exercised that no copper apparatus is used in an installation. See CALCIUM, GAS (HEATING, &c.).

Achaia, a small Greek district lying along the northern coast of the Peloponnesus, forms with Elis a department (pop. 272,000) in the modern republic. Its chief town is Patras (q.v.). — The Aryan Achaians were not the earliest inhabitants of Greece, but seem to have invaded from the north a Mediterranean race characterised by the Mycenean culture revealed by Schliemann, connected with the Minoan culture of Crete (see GREECE). As the Achaians (Achæans) were the ruling people of the Peloponnesus in heroic times, Homer speaks of the Greeks generally as *Achaioi*. Their twelve little towns formed a confederacy, renewed in 281 B.C., and subsequently extended, under the name of the *Achæan League*, throughout Greece, until 146 B.C., when Greek liberty fell under the power of Rome.

Achard, FRANZ KARL, born in 1754 at Berlin, distinguished himself by his improvements in the manufacture of beetroot sugar; the king of Prussia having given him a farm whereon to found a model factory. Achard was called to Berlin as director of the physical class in the Academy of Sciences, and died in 1821.

Acha'tes, the constant companion of Æneas in his wanderings after the capture of Troy. He is always styled by Virgil 'fidus Achates,' hence the name has become a synonym for a trusty defendant and companion.

Acheen. See ATCHIN.

Achelo'us, now called *Aspropot'amo*, a river in western Greece, rises in Mount Pindus, flows south and south-west, dividing in its lower course Ætolia from Acarnania, and falls into the Ionian Sea opposite Cephalonia. The alluvial deposits at its mouth are very extensive. In Greek mythology, the god of this river was the oldest of the river gods, and was the son of Oceanus and Tethys.

Achene, a dry, indehiscent, single-seeded fruit. The term is often restricted to fruits like those of the common dock, resulting from a superior ovary, the wall of which does not adhere to the seed. But it is perhaps better to extend the term achene to all dry, indehiscent fruits, including forms like grains of wheat, 'seeds' of dandelions, nuts of hazel, and so on. See FRUIT.

Ach'eron, the name given to several rivers by the ancients, always with reference to some peculiarity, such as black or bitter waters, or mephitic gases. The Acheron, in Thesprotia in Epirus, flowing through the lake Acherusia into the Ionian Sea; another river of the same name in Elis, now called Sacuto; and several streams in Egypt —were all supposed to have some communication with the infernal world. According to Pausanias, Homer borrowed from the river in Thesprotia the name of his infernal Acheron, which the later poets surrounded with many imaginary horrors. Other lakes or swamps of the same name occur near Hermione in Argolis, between Cumæ and Cape Misenum in Campania, and in Egypt, near Memphis.

À-cheval Position. When troops are arranged so that a river or highway passes through the centre and forms a perpendicular to the front, they are said to be drawn up in *à-cheval* position.

Achievement, in Heraldry, originally arms granted for the performance of an honourable action; hence a complete representation of one's armorial ensigns. See HATCHMENT.

Achill, or 'Eagle' Isle, off the west coast of Ireland, is reckoned within the county of Mayo. It is 15 miles long by 12 miles broad, and has a very irregular coast-line. It has a wild and desolate appearance; most of the surface is boggy; of the 51,500 acres which the island contains, not 500 are cultivated. There are three villages in Achill, and a number of hovels or huts scattered over its barren moors, sometimes in small clusters, forming hamlets, but so wretched as hardly to be fit for beasts. Achill rises towards the north and west coast, where the mountains attain an elevation of 2000 feet. One of them, Achill Head, composed, like the rest of the island, wholly of mica-slate, presents towards the sea a sheer precipice from its peak to its base, a height of 2192 feet. There is a mission-station in the island. The population—4000 in 1851—exceeded 6200 in 1891, and is now about 5300.

Achillæa. See MILFOIL.

Achilles, the hero of Homer's *Iliad*, was the son of the nereid Thetis and Peleus, who was son of Æacus, and king of the Myrmidons at Phthia in Thessaly. He was taught eloquence and the arts of war by Phœnix, and the healing art by the centaur Chiron. He led his Myrmidons in fifty ships to Troy, although he knew that he would not return. In the war he was the bulwark of the Greeks, being at once the swiftest and bravest hero in the army. He destroyed many towns in the Troad before his quarrel with Agamemnon, with which the *Iliad* opens. A pestilence in the Greek camp being ascribed to the anger of Apollo, whose priest had been robbed of his daughter Chryseïs by Agamemnon, that chief was compelled by the army to send the girl back to her father. On this he carried away Briseïs, the fair captive of Achilles. The latter now retired to his tent, and neither the splendid offers made by Agamemnon nor the disasters of the Greeks could afterwards move him to take any

part in the contest, until his dear friend Patroclus was slain by Hector. The hero then buckled on his armour, which had been made for him by Hephæstus, and of which the shield is described at great length by Homer. The fortunes of the field were now suddenly changed in favour of the Greeks; and the vengeance of Achilles was not satiated until he had slain a great number of the Trojan heroes, and lastly Hector himself, whose body he fastened to his chariot and dragged into the Grecian camp. He then buried his friend Patroclus with great funeral honours. King Priam, the father of Hector, came by night to the conqueror's tent, and prayed that the body of his son might be given to him. Achilles consented; and with the burial of Hector the *Iliad* closes. The hero himself fell in battle at the Scæan gate before the city was taken. His death is not expressly mentioned in the *Iliad*, but in the *Odyssey* his remains are buried, together with those of Patroclus, in a golden urn on the coast of Hellespont, where a mound was raised over them. Such is the Homeric account of Achilles, the swift-footed, fair-haired hero of the *Iliad*. He is at once the handsomest and bravest of the Greeks, terrible to his foes, tender and gentle with his friends, magnanimous and proud, defiant to the unjust prince, but reverent and obedient to the gods. He loves music, is the most devoted of friends, has a passionate hunger for glory, and dies in the full splendour of his youth. There are many later traditions which fill up the bare outlines of his history. His mother dipped him when an infant into the Styx, and hence he became invulnerable except in the heel by which she held him. To escape the fatal expedition to Troy, she hid him in the disguise of a girl at the court of Lycomedes at Scyros, but here his sex soon made itself known, for one of the king's daughters became by him the mother of a son, Pyrrhus or Neoptolemus. Ulysses discovered him by an artful stratagem. Disguised as a pedlar, he came to offer his wares for sale: the girls at once showed a natural interest in the articles of dress and ornaments, but the eager interest which he could not hide in the weapons of war at once revealed the youthful hero. Among his achievements at Troy are his conquest of the Amazon Penthesilea and of Memnon. Nor does he fall by human hands alone. Some say that he was killed by Apollo himself; others, that the god merely guided the weapon of Paris. Another story tells how the hero fell in love with Polyxena, daughter of Priam, and how he came unarmed to meet her in a temple of Apollo, where he was shot in the vulnerable heel by the treacherous Paris. His body was rescued by Ulysses and the Telamonian Ajax, and these heroes had a fierce contest for his famous armour. The hero was carried to the islands of the blessed, where he was united to Medea or Iphigenia.

Achilles Tatius, or STATIUS, an Alexandrian Greek rhetorician, author of the romance of *Leucippe and Cleitophon*, proved by an Oxyrhynchus papyrus fragment to be not later than the first half of the 4th century A.D., is said to have become a Christian bishop, and may have been an astronomer.

Achilles Tendon (*Tendo Achillis*) attaches the soleus and gastrocnemius muscles of the calf of the leg to the heel-bone. It is capable of resisting a tension strain equal to 1000 lb. weight; and yet it is occasionally ruptured by the contraction of these muscles in sudden extension of the foot, such as may occur in the case of old gentlemen dancing, or in the attempt to recover equilibrium after a stumble. For the name, see ACHILLES. Ancient surgeons regarded wounds or serious bruises of the Achilles tendon as fatal.

Achi'menes, a genus of plants of the natural order *Gesneraceæ*, cultivated in stoves and greenhouses for the beauty of their flowers. The species are numerous—natives of tropical America.

Achlamydeous. See APETALOUS.

Achromatism, the property in virtue of which certain combinations of lenses, &c., refract a beam of light without producing coloured fringes. Any arrangement of lenses or prisms which refract light without dispersion (see under LIGHT) is achromatic.

Hall in 1733, and later Dollond (independently), found that certain media give large refraction with small dispersion, while others give small refraction with large dispersion; so that the dispersion produced by one medium can be made to annul that due to another, while its refraction is not entirely annulled. For example, by properly combining a convex lens of crown-glass with a concave one of flint-glass, a compound achromatic lens can be produced. The achromatism in the above arrangement, and in every other arrangement yet tried, is not absolutely perfect. The reason is that such media do not give exactly similar spectra (see SPECTRUM)—i.e. the ratio of the angular separations of any two pairs of rays is not quite the same for the different media. A combination of three lenses, or prisms, gives a better approximation to absolute achromatism than a combination of two. Blair in 1791 constructed an achromatic telescope giving very fine definition for high magnifying power. He used a compound lens consisting of two glass lenses enclosing a liquid. Modern glasses can be made of such quality as to give practically perfect achromatic combinations.

Acidimetry is the determination of the percentage of real acid contained in a sample of a hydrated acid, as sulphuric or nitric acid. In most cases, if we know that no foreign body is present, it is possible to determine the percentage by means of the specific gravity, as indicated by the Hydro meter (q.v.). Usually, however, other substances, which alter the specific gravity, may be present, and recourse is then had to one of the following methods:

(1) By volumetric analysis, in the manner described under Alkalimetry (q.v.).

(2) By the gravimetric process. This may be conducted in two ways, which will be best understood by an example of each. Sulphuric acid forms several insoluble salts, the sulphate of barium refusing to dissolve, not only in ordinary fluids, but even in strong acids. When chloride of barium is added to a liquid containing sulphuric acid, the sulphate of barium is precipitated, and after due precautions have been taken to insure its purity and to avoid erroneous conclusions, it may be weighed and the amount of sulphuric acid calculated therefrom.

A more rapid method consists in adding to the sample some carbonate of soda, and noting the amount of carbonic acid disengaged. This is readily accomplished by performing the operation in a weighed flask, and determining the loss of weight after the carbonic acid gas has been liberated. Of course many precautions are essential. See also ANALYSIS.

Acids. An acid is a chemical compound distinguished by the property of combining with bases (oxides and hydroxides) in definite proportions to form Salts (q.v.). The most striking characteristics of acids are a sour taste and the property of reddening blue litmus-paper. They are also mostly oxidised bodies; and at one time oxygen was thought to be essential to an acid, as the name *oxygen* (the acid-producer) indicates. Subsequent experience has extended the definition. The ele-

ments that form the strongest acids with oxygen are the non-metallic, and most of them have more than one stage of acid oxidation. Thus sulphur unites with oxygen to form two oxides, SO_2 and SO_3, which, in combination with water, yield respectively sulphurous and sulphuric acid. Similarly, arsenic forms two oxides, As_2O_3 and As_2O_5, corresponding to arsenious and arsenic acids. The higher stage of oxidation forms the stronger and more stable acid. Except arsenic, all metals that form acids with oxygen have also, at a lower stage of oxidation, one or more oxides. To these inorganic acids containing oxygen must be added the organic acids, composed of carbon, hydrogen, and oxygen. Belonging to this extensive group are oxalic acid, $H_2C_2O_4$; acetic acid, $HC_2H_3O_2$; and formic acid, $HCHO_2$. There are also acids found in animal fluids, or resulting from their decomposition, which contain nitrogen in addition to the three elements above named; such is uric acid, $H_2C_5H_2N_4O_3$. The *hydrogen acids* are formed of hydrogen and a radical, either simple or compound. The most important of these, and the type of its class, is hydrochloric, HCl; others are sulphuric (H_2SO_4) and hydrocyanic (HCN) acids.

The Ionisation Theory explains many of the properties of acids. Every acid in dilute solution gives numerous ions by ionisation—i.e. dissociation. Two sets of ions are formed, positive ions (hydrogen ions, in the case of acids) and negative ions. The latter may be a compound radical like sulphate, SO_4'', or an element like chloride, Cl'. An acid which is ionised is represented thus:

$$H_2SO_4 \rightleftharpoons H_2^{\cdot} + SO_4'', \quad \text{sulphuric acid.}$$
$$HNO_3 \rightleftharpoons H^{\cdot} + NO_3', \quad \text{nitric acid.}$$
$$H{\cdot}COOCH_3 \rightleftharpoons H^{\cdot} + COOCH_3', \quad \text{acetic acid.}$$

The acidic properties of an acid are wholly due to the positive hydrogen ion. The relative 'strength' (or activity) of two acids is dependent on the amount of ionisation—i.e. dependent on the number of hydrogen ions. In solutions of acetic acid, and hydrochloric acid of equal concentration, the former is not nearly so 'strong' an acid as the latter, because it is not so much ionised. Acetic and oxalic acids are 'weak' acids; sulphuric, nitric, and hydrochloric acids are 'strong' acids.

Acids have one or more atoms of hydrogen which are replaceable by a metal, when the latter is represented in the form of a hydroxide. Thus nitric acid and sodium hydroxide yield nitrate of soda and water:

Nitric Acid.		Sodium Hydroxide.		Nitrate of Soda.		Water.
HNO_3	+	NaHO	=	$NaNO_3$	+	H_2O,

in which reaction the hydrogen of the nitric acid is replaced by the sodium of the sodium hydroxide (caustic soda), and as only *one* atom of hydrogen is replaced, nitric acid is said to be *monobasic*. When an acid admits of the displacement of two atoms of hydrogen, it is termed *dibasic*—as tartaric, oxalic, and sulphuric acids; and when three atoms can be replaced—as in common phosphoric acid, H_3PO_4, in which H_3 may be replaced by K_3 or Ag_3, the acid is termed *tribasic*. The more important acids are included in the following list:

Acids containing no oxygen: Hydrochloric, HCl; hydrobromic, HBr; hydriodic, HI; hydrocyanic, HCN; hydrosulphuric or sulphuretted hydrogen, H_2S.

Inorganic acids containing oxygen: Boracic, H_3BO_3; carbonic, H_2CO_3; chromic, H_2CrO_4; hypophosphorous, HPH_2O_2; nitric, HNO_3; phosphoric, H_3PO_4; phosphorous, H_2PHO_3; sulphuric, H_2SO_4; sulphurous, H_2SO_3.

Organic acids: Acetic, $HC_2H_3O_2$; benzoic, $HC_7H_5O_2$; citric, $H_3C_6H_5O_7$; gallic, $H_4C_7H_2O_3$; lactic, $HC_3H_5O_3$; salicyclic, $HC_7H_5O_3$; tartaric, $H_2C_4H_4O_6$. See the articles on the several acids.

The most characteristic inorganic acids (hydrochloric, nitric, phosphoric, sulphuric) are used in medicine in a very dilute condition as tonics and astringents, and to allay thirst in fevers. They corrode the teeth, however, and if long administered tend to disorder digestion; so they must be used with caution. Most of the group have special, some (as hydrocyanic, oxalic) extremely poisonous actions. The stronger acids, when concentrated, are powerful caustics.

Applied to rocks, acid, as opposed to basic, means rich in silica.

Acipenser. See STURGEON.

Aci-rea'lë, a town of Sicily, in the province of Catania, 50 miles SW. of Messina by rail. It lies on a bed of lava at the foot of Mount Etna, where the small river Aci (*Acis*) enters the sea. It is the see of a bishop, and has famous mineral wells and sea-bathing; and near it are spots associated with the myths of Acis and Galatea, and Polyphemus. The 36,000 inhabitants depend largely on agriculture, and on manufactures of pottery and leather.

Acis, in Ovid's account, a son of Faunus, beloved by the nymph Galatea, and through jealousy killed by Polyphemus the Cyclops. He was crushed under a huge rock, and his blood, as it gushed from beneath the rock, was changed by the nymph into the river Acis.

Ackermann, RUDOLPH, a native of Saxony (born 1764—died 1834), came in 1795 to London, where he opened a print-shop in the Strand. He introduced lithography as a fine art into England, and was the originator of the 'Annuals' (q.v.), which he commenced by his *Forget-me-not*, published in 1823 and following years. Among the illustrated works published by him were his *Repository of Arts, Literature, and Fashions* (1809–28), and works illustrating London, Westminster Abbey, Oxford, and Cambridge. He greatly promoted engraving in England.

Ackworth. See PONTEFRACT.

Acland, SIR HENRY WENTWORTH, K.C.B. (1884), regius professor of medicine at Oxford 1858–94, was born 23d August 1815, from Harrow proceeded to Christ Church, Oxford, and having in 1841 obtained an All Souls fellowship, in 1848 took his M.D. In 1890 he was made a baronet. He died 16th Oct. 1900.—His eldest brother, Sir THOMAS DYKE ACLAND, born at Killerton, Devon, 25th May 1809, was educated at Harrow and Christ Church, entered parliament in 1837 a Conservative, but in 1865 turned Liberal. In 1871 he succeeded his father as eleventh baronet. He died 29th May 1899. *His* second son, SIR ARTHUR HERBERT DYKE ACLAND (1847–1926), was educated at Rugby and Christ Church, and in 1885–99 was Liberal M.P. for the Rotherham division of Yorkshire, in 1892–95 was Vice-president of the Council (Education).

Aclinic Line is a name for the magnetic equator, which cuts the terrestrial equator, inasmuch as on that line the magnetic needle has no dip, but lies horizontal. The aclinic line is irregular and also variable. *Aclinic* is from the Greek words signifying 'not bending.' See MAGNETISM, DIPPING-NEEDLE.

Ac'ne is an important skin disease. It is associated with dyspepsia, constipation, and other functional irregularities, and insufficient exercise is often a cause. Any local irritation is apt to bring out a crop of the pimples in predisposed people. The sebaceous follicles of the Skin (q.v.) are the primary seat of the affection. Their natural secretion accumulates in their interior, and there is at the same time a tendency to inflammation of the

follicle and surrounding tissue. It is by no means rare to find on the face and shoulders of young persons about or above the age of puberty a number of black spots, each of which is placed on a slightly-raised pale base. These black points are called *comedones*. Pressure at the base occasions the expulsion of a little, elongated, spiral, white mass, with a black point or anterior end, commonly but erroneously regarded as a worm; though in the midst of the white mass of sebaceous matter, a parasite, *Acarus folliculorum* (q.v.) is occasionally found. Interspersed are other spots, with the base more raised and inflamed, which become more or less perfect pustules, each of which rests on a comparatively large red base. Around some of the inflamed follicles, coagulated lymph (to use the old phraseology) is thrown out, and a small hardened mass is the result. According as one or other of these appearances preponderates, we have different varieties of this disease. When the pustule is the most striking feature, the affection is called *Acne simplex* or *vulgaris;* when the black points abound, it is *Acne punctata;* and when there is decided induration, it is *Acne indurata*. We have already mentioned the age at which this affection commonly occurs: it is never seen in children, and is rare in aged persons.

As long as there is no inflammation, the treatment simply aims at favouring the escape of the contents of the sebaceous follicles, by rubbing the face and other affected parts with cold cream at bedtime, washing on the next morning with soap and water, and vigorous friction with a towel or gentle pressure with a 'comedo extractor.' When acute inflammation is present, and the pustules are very tender, dabbing with eau de Cologne or with weak solution of mercuric chloride in spirit gives relief; and subsequently sulphur ointment is useful. *Acne indurata*, which is the least tractable of the three forms, is often benefited by repeated painting with tincture of iodine; and vaccines made from the bacteria in the pustules form a favourite method of treatment. In all these cases the state of the digestive and sexual organs must be carefully attended to.

ACNE ROSACEA, also called Rosacea and Gutta Rosea, is so different from the forms of acne above described that it is regarded by most authorities as a distinct disease. It usually first appears at or near the end of the nose; and in some cases it is confined to the nose, while in others it extends to the cheeks, forehead, chin, or even to the whole face. The skin in the part affected assumes a deep red colour, usually transient at first, but returning either on no special provocation, or in consequence, apparently, of some gastric or other disturbance, and after a time becomes permanent; pimples resembling those of *Acne simplex* may appear, but are associated with itching and burning sensations not present in the ordinary forms of acne. The skin of the diseased part, in some cases, is irregularly swollen, and may become enormously hypertrophied, especially that of the nose. In such cases, it is marked with blue or red streaks, caused by congestion and enlargement of the capillaries; the whole surface, in a severe case, presenting a very disagreeable and repulsive appearance. This affection is no doubt often a result of intemperate living, but it may occur in persons of regular habits of life. Disorder of the digestive system is so often associated with it, as to exclude the idea that the combination is accidental, and the skin disease may often with great probability be referred to gastric disturbance as the exciting cause. In women, however, it is very frequently associated rather with disorder of the menstrual functions. The disease is confined almost exclusively to persons in middle or advanced life, and women are especially liable to it about the period in which what is popularly known as the 'change of life' occurs: moreover, it has occasionally been observed to be hereditary.

The general treatment must be governed by the digestive or menstrual disorders associated with it; and a nourishing but bland and non-stimulating diet—above all, abstinence from alcohol—is of great importance. In the early stages, and in irritable forms of the disease, the local treatment should be soothing. Emollient lotions, such as thin starch, a bismuth and calamine lotion, &c., may be occasionally used during the day, and in severe cases a bread poultice may be applied to the face at night. When the affection becomes indolent, the emollients should be gradually replaced by stimulating applications, which have also the effect of constricting the dilated blood-vessels. For this purpose a lotion containing precipitated sulphur, calamine, and glycerine is useful, or a 10 per cent. solution of ichthyol in water. When the veins are greatly dilated they must be destroyed by incisions or touched with the galvano-cautery; if the skin be much hypertrophied, removal of pieces by a surgical operation often produces great improvement in appearance.

Acœmetæ (Gr. *akoimētai*, 'sleepless ones'), a congregation of monks founded in 460 near Constantinople, whose peculiarity it was, by means of alternating choirs, to keep divine service going on day and night without intermission in their monastery. They ceased to exist in the 6th century.

Acokanthera, an African genus of apocynaceous plants, which furnishes Zulu arrow-poison.

Ac'olytes (Gr., 'followers') were the young clerics who assisted the bishops and priests in the performance of religious rites, lighting the candles, presenting the wine and water at the communion, and the like offices. They were considered as in holy orders, and ranked next to sub-deacons. These services have, since the 7th century, been performed by laymen and boys, who are improperly called acolytes; but in the Catholic Church, aspirants to the priesthood are still at one stage consecrated as acolytes. See ORDERS (HOLY).

Aconcagua, the highest peak of the Andes and of the American continent, rising to a height of 23,000 feet. The mountain, which is an extinct volcano, is about 100 miles ENE. of Valparaiso, near the Chilean frontier, but within the Argentine boundary. It gives name to a Chilean province. (Pop. 117,000).

Aconite (*Aconitum*), a genus of Ranunculaceæ (q.v.), having five petaloid sepals, of which the

Monk's-hood (*Aconitum napellus*):
a, fruit; *b*, root.

upper one is helmet-shaped; and two hammer-headed petals (nectaries) concealed within the

helmet-shaped sepal. The fruit consists of 3–5 follicles. *A. napellus*, the common Wolf's-bane or Monk's-hood, often cultivated in flower-gardens for the sake of its erect racemes of blue flowers, is a doubtful native of England, but common in some parts of Europe. The roots are fusiform and clustered. The root and whole plant are very poisonous, as containing the alkaloid aconitin. Some sixty species of aconite are known, natives of north temperate mountainous regions both of the eastern and the western hemispheres. The virulent *bikh* poison of India, equally fatal in its effects whether introduced into wounds or taken into the stomach, is prepared from the roots of several species, including *A. ferox*. *A. album*, or white-flowered monk's-hood, a native of the Levant, and *A. lycoctonum*, yellow-flowered monk's-hood, or wolf's-bane, a native of the Alps, are not infrequent in our flower-gardens.—The so-called Winter Aconite, a genus of dwarf spring-flowering ranunculaceæ, is technically called *Eranthis*, and has half-a-dozen species, including *E. hiemalis* and *E. Sibiricus*. *E. hiemalis* is naturalised in Britain. The petals take the form of honey-bearing tubes. The sepals are light yellow.

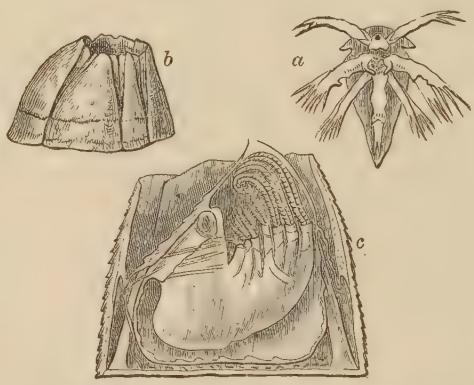
Acon'itin, the active principle of monk's-hood and other aconites, is one of the most potent poisons known, so small a quantity as $\frac{1}{60}$th of a grain of the pure alkaloid having nearly proved fatal. Hence its recognition in poisoning cases is a matter of difficulty, and requires delicate tests. When applied to the eye in even very dilute solution, it causes a sensation of intolerable heat and tingling, the pupil at the same time contracting. This tingling, associated with numbness, is felt when a piece of aconite root is chewed, and on account of this peculiar property, aconitin, or a preparation of aconite, is sometimes used in the treatment of neuralgia, rheumatism, and toothache.

Acorn. See Oak.

Acorn-shells (*Balănus*), a genus of Cirripedes (q.v.), in the class Crustacea. The classical title refers to that remote resemblance to acorns which their popular name also records. They occur in great abundance incrusting the rocks between high and low water mark, and are exceedingly familiar objects. At first sight, and in their adult form, all cirripeds are so unlike crustaceans, that even Cuvier regarded them as molluscs. In 1829, however, their true nature was detected by Vaughan Thompson, who observed the young forms to be free-swimming, and to exhibit characters which stamp them at once as crustaceans.

Structure.—The common sessile acorn-shell may be briefly described in Huxley's words as 'a crustacean fixed by its head, and kicking its food into its mouth with its legs.' The body is enveloped in a fold of skin, or mantle, which forms round about the animal a conical protective shell of six pieces, and a fourfold movable lid. When the animal is active (only, of course, under water), six pairs of curl-like double legs may be seen alternately protruded and retracted through the valvular opening of the shell. These are borne on the thorax of the animal, and serve to brush the floating food down to the mouth, where it is seized and masticated by the three pairs of jaws. The abdominal portion of the animal is degenerate, and the characteristic crustacean jointing is at best indistinct. Since the animal really stands on its head, the single pair of antennæ are found on the middle of the base or lower surface, and are extremely reduced. The attachment is effected by the hardened secretion of complex cement-glands, which probably represent modified excreting organs. The special sense organs degenerate, but the nervous system is well developed, and the surface of the legs seems to have a general tasting sensitiveness. The alimentary canal is in no way peculiar; and though no heart has been demonstrated, the blood has a definite course. Respiration must be largely effected by the ceaselessly waving legs, but there are also folded plates on the inside of the mantle which may represent special breathing organs. The acorn-shells are hermaphrodite, and the eggs are attached to the folded plates just mentioned. When the young larvæ free themselves from their egg-cases the shell is opened, and the legs cease to kick till they effect their escape.

Life-history.—The contrast between the sessile adults and the free-swimming young is very striking. The first larval stage is a *Nauplius* (q.v.) like that of other lower crustaceans. It has the usual three pairs of legs, an unpaired eye, and a delicate shield on its back. It moults several times, grows bigger, and develops a firmer shield, a longer spined tail, and stronger limbs. The second short chapter in its history is known as the Cypris stage, in which the larva acquires two side eyes, six pairs of swimming legs, a bivalve shell, and other organs. At the end of this stage, during which no food is

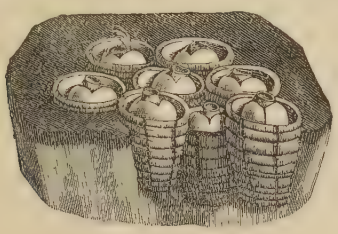


a, Pelagic larva of acorn-shell; *b*, external shell of adult; *c*, vertical section of adult. (From Darwin's Monograph.)

eaten, the larva becomes fixed by its feelers and the glue of the cement-gland. A new regime begins; some organs such as the side eyes, the antennæ, the bivalve shell, the tail, and the swimming legs, are lost; while new structures appear, such as the curled waving legs, and the incipient external shell. During these changes there is quiescence and fasting, and the stage was described by Darwin as the 'pupa.' The skin of the pupa moults off, certain changes of position take place, and the permanent structure and activities of the adult are gradually assumed. The external firm shell of the rapidly growing adult cannot, of course, be moulted, but at frequent periods the whole lining of the shell and the skin of the legs is shed (see Skin-casting). These cast coats are exceedingly common, especially during the spring months. Darwin quotes an observation of Mr C. W. Peach, who notes their extraordinary abundance, and says, 'he could easily have filled several quart measures with them.'

The acorn-shells feed on small marine animals. They are attached not only to rocks, but to floating objects and to other animals. Numerous species are known, of which *B. improvisus* inhabits brackish water. The sessile *Balanidæ* differ from the stalked Barnacles (q.v.) or *Lepadidæ* only in detail; in both families the waving legs are borne by the thorax, and they were therefore classed by Darwin, in his famous memoir of the Cirripedia, in the sub-order Thoracica. Some of the larger

species of balanus were esteemed by the Romans, and are still eaten by Chinese and others. *B. psittacus* sometimes measures 4 inches in



Acorn-shells in the skin of a whale.
(From Bronn's *Thier-Reich.*)

diameter, and *B. tintinnabulum* is also large. See Darwin's *Monograph of Cirripedia* (2 vols. 1851–54); Huxley's *Invertebrata.*

Acorus. See CALAMUS.

Acosta, GABRIEL, or URIEL D', a Portuguese of noble Jewish birth, was born at Oporto about 1594. Brought up a Catholic, he early adopted the faith of his fathers, and fled to Amsterdam, only to find there how little modern Judaism accorded with the Mosaic Law. For his *Examination of Pharisaic Traditions* (1624), a charge of atheism was brought against him by the Jews before a Christian magistracy; and having lost all his property, twice suffered excommunication, and submitted to humiliating penance, he at last shot himself (1640). His autobiography was published in Latin and German (Leip. 1847).

Acotyle'donous Plants—i.e. without seed-leaves or cotyledons—a term first emphasised by A. L. de Jussieu, who included all the plants now known as cryptogams under the title *Acotyledŏnes.* They include Algæ, Fungi, Liverworts, Mosses, Ferns, Horsetails, Lycopods (q.v.), and are contrasted with the conifers, monocotyledons, and dicotyledons, which produce seeds containing an embryo with rudimentary root, stem, and leaves. The term is no longer in use. See CRYPTOGAMIA.

Acoustics (Gr. *akouo*, 'I hear') is sometimes used for the science of sound in general, which in this work is treated at SOUND, but more commonly for the special practical branch of that science which deals with the construction of public halls, churches, &c. so as to secure the accurate hearing of speech or music. It must be confessed that, in this practical sense, the science is still in its infancy. It is very easy, in general, to point out the causes of acoustic defects in a building *once it has been erected and tried;* it is quite another matter to predict from the plans what are likely to be its defects; except, of course, when some flagrant violation of simple principles has been perpetrated. One reason for this is obviously the want of data on which to reason, due to the enormous cost which would be involved in a thorough experimental treatment of the subject. The consequence is that when by chance one successful attempt has been made, architects prefer to copy it rather than to attempt some new form, which might probably entail complete failure.

The improvement of the acoustic properties of a building must be determined by the ascertained defects, so that no general rules can be laid down. One great point is the prevention of echoes, unless these reach the ear almost at the same moment with the original sound. This can be effected in many cases by lowering the ceiling so as to expedite the echo; also by hanging carpets or heavy tapestry on the walls, and especially in the corners of the building. These have the effect of abolishing it. Idiotic attempts are constantly being made nowadays to secure the same results by stretching wires about in various directions. Such devices betray absolute ignorance of the mode of propagation of sound.

Acquaviva, a town of Bari, South Italy, in a healthy situation at the foot of the Apennines, on the Bari and Taranto Railway, 28 miles SSE. of the former town. Pop. 12,000.

Acqui (Lat. *Aquæ Statiellæ*), a town of Northern Italy, 21 miles SSW. of Alessandria by rail. It derives its name from its hot sulphur springs, which were known to the Romans. The town contains an old castle, a Gothic cathedral (12th century), and remains of a Roman aqueduct. Wine and silk are produced. Pop. 15,000.

Acquiescence is the name applied to an important principle of equity in the law of both England and Scotland. It means either (1) the failure for a length of time to take an objection, of which the party is aware, to an invalid or challengeable agreement, or a set of accounts; or (2) the failure to object to any important proceeding by another person, involving expense and difficulty of restoration, in such circumstances that it is fair to conclude that the person failing to object has tacitly agreed to his property or other rights being dealt with. Acquiescence closely resembles the Scottish doctrine of *rei interventus* in the law of contracts, and also to some extent the doctrine of estoppel by conduct in the law of England.

Acras'peda. See JELLYFISHES.

Acre, a word (from A.S. *æcer*) which is identical with Gothic *akr-s*, Ger. *acker* ('a cultivated field'), Lat. *ager*, Gr. *agros*, Sansk. *ajras.* Most nations have, or had, some measure nearly corresponding; originally, perhaps, the quantity which one plough could plough in a day. The English statute acre consists of 4840 sq. yards. The chain with which land is measured is 22 yards long, and a square chain will contain 22 × 22, or 484 yards; so that 10 sq. chains make an acre. The acre is divided into 4 roods, a rood into 40 perches, and a perch contains 30¼ sq. yards. Before the fixing of the statute acre (Act 5, George IV. c. 74) the acre varied in different parts of the country, and still survives locally in several counties; it varies in size from 2·115 statute acres in Cheshire to 0·477 in Leicestershire. The old Scotch acre is larger than the English, the Irish than the Scotch; 23 Scotch acres = 29 imperial acres; 30¼ Irish acres = 49 imperial. The hectare (nearly 2½ acres; see ARE) of the French metric system has on the Continent superseded almost all the ancient local measures corresponding to the acre—such as the Prussian *morgen.*

English acre		1·00
Scotch	"	1·27
Irish	"	1·62
France	Hectare (=100 ares)	2·47
	Arpent (old system)	0·99
Prussia	Little Morgen	0·63
	Great Morgen	1·40
United States, English acre		1·00
Roman Jugerum (ancient)		0·66
Greek Plethron (ancient)		0·23

Acré, or AQUIRY, a tributary of the Purús, gives its name to a rubber-producing Brazilian territory (60,000 sq. m.; pop. 100,000), a subject of dispute with Bolivia till 1903.

Acre, ST JEAN D', or ACCA, the Biblical *Accho*, a seaport of Palestine, 80 miles NNW. of Jerusalem, and 27 S. of Tyre. Population, 10,000. The harbour is partly sanded up, yet is one of the best on this coast. It was named Ptolemais from King Ptolemy Soter of Egypt. Taken by the Crusaders in 1110, it was recovered in 1187 by the Sultan Saladin; but retaken in 1191 by Richard I. of England and Philip at a cost of 100,000 men.

The town was now given to the Knights of the Order of St John, who kept it by constant fighting for a hundred years. In 1517 it was captured by the Turks; in 1799 it was besieged by the French for sixty-one days, but was successfully defended by the garrison, aided by a body of English sailors and marines under Sir Sidney Smith. In 1832 it was stormed by Ibrahim Pasha, son of the viceroy of Egypt, and continued in his possession till it was bombarded and taken, in 1840, by a combined English, Austrian, and Turkish fleet. The British took it in September 1918. It is a centre of the Bahai movement.

Acri, a town of South Italy, 13 miles NE. of Cosenza; pop. 4000.

Acrididæ. See LOCUST.

Acrobat literally signifies one who walks on tiptoe (Gr. *akron*, 'extremity,' *bainō*, 'I go'), and designates one who performs difficult feats, vaulting, sliding, tumbling, and dancing on a slack or tight rope, stretched either horizontally or obliquely. These feats require great skill, suppleness, and steadiness. The extraordinary skill of some performers has given this perilous art a great celebrity. Within modern times Farioso, Madame Saqui, and Signor Diavolo have excited admiration by their marvellous agility; Blondin was even more widely known. The acrobats of antiquity appear to have closely resembled those of our own day.

Acroceraunia, a promontory of Albanian Epirus, jutting out into the Ionian Sea, the termination of the Montes Ceraunii. This range derived its name from the frequent thunder-storms which occurred among its peaks (Gr. *keraunos*, 'thunder'). The coast of the Acroceraunia was dangerous to ships; hence Horace in a well-known ode speaks of its 'ill-famed rocks.' Its mountains are alluded to by Shelley in his poem *Arethusa*.

Acrocomia. See PALM.

Acrogens (Gr., 'summit-growers'), a term applied to the higher cryptogamic plants in which root, stem, and leaf are usually distinctly developed—e.g. ferns, club-mosses, horsetails, &c. The name refers to the structure and growth of the stem in which the vascular bundles when present are 'simultaneous' (see STEM) in development, and growth occurs only at the apex, while increase in thickness is effected by the coherence of leaf-bases or the formation of roots. Of this 'acrogenous' growth, tree-ferns are the best examples. The term has, however, fallen into disuse, along with the terms Exogen and Endogen (q.v.), on account of the erroneous views of dicotyledonous and monocotyledonous stem-growth which these latter respectively imply.

Acrolein, $CH_2:CH\cdot CHO$, an unsaturated aldehyde. It is a colourless liquid, boiling at 126° F. (52° C.). It constitutes the acrid principle produced by the destructive distillation of fatty bodies, and is in part due to the decomposition of glycerine. It is prepared by distilling glycerine with a dehydrating agent, potassium-hydrogen sulphate being generally employed. Two molecules of water are removed, acrolein being left, $C_3H_5(OH)_3 = C_3H_4O + 2H_2O$. In its state of vapour, it is extremely irritating to the eyes, nostrils, and respiratory organs—a property to which it owes its name. The pungent smell given off by the smouldering wick of a candle just blown out is due to the presence of acrolein. When mixed with a solution of potash or soda, the irritating odour disappears, and is replaced by an odour of cinnamon, while a brown resinous substance is formed; and certain oxidising agents, as oxide of silver, convert it into *acrylic acid*, C_2H_3COOH.

Acroliths (Gr. *akron*, 'extremity,' and *lithos*, 'a stone'), the name given to the oldest works of Greek plastic art, in which wood-carving is seen in transition into marble statuary. The trunk of the figure is still, in the old style, of wood, covered with gilding or with actual cloth drapery; but the extremities—head, arms, feet—which are meant to appear naked from below the drapery, are of stone. Compare the *chryselephantine* statues.

Acromegaly, a disease characterised by overgrowth of the face, hands, feet, and other parts. See PITUITARY BODY.

Acropolis, 'the high-town,' was, in many of the important cities of Greece and Asia Minor, the name of the citadel. It usually occupied the summit of a rock or hill, and was fortified, commanding the city and its environs. It contained some of the most important public buildings, especially temples, besides affording a last refuge in case of a hostile attack. The acropolis, like the castle of the middle ages, formed the centre or nucleus around which the town gradually grew. Notable amongst these old Greek strongholds were the Acropolis of Argos; that of Messene; that of Thebes, called Cadmea; that of Corinth, known as Acro-Corinthus; but especially that of Athens, which was styled pre-eminently the Acropolis, and contained the Parthenon, the Erechtheum, and other famous buildings. See ATHENS.

Acrostic (Gr., made up of *akros*, 'pointed, first,' and *stichos*, 'a row'), a term for a number of verses the first letters of which follow some predetermined order, usually forming a word—most commonly a name—or a phrase or sentence. Sometimes the final letters spell words as well as the initial, and the peculiarity will even run down the middle of the poem like a seam. Sir John Davies composed twenty-six *Hymns to Astrea* (Queen Elizabeth), in every one of which the initial letters of the lines form the words ELISABETHA REGINA. The following is one of the twenty-six:

E v'ry night from ev'n to morn,
L ove's chorister amid the thorn
I s now so sweet a singer;
S o sweet, as for her song I scorn
A pollo's voice and finger.

B ut, nightingale, sith you delight
E ver to watch the starry night,
T ell all the stars of heaven,
H eaven never had a star so bright
A s now to earth is given.

R oyal Astrea makes our day
E ternal with her beams, nor may
G ross darkness overcome her;
I now perceive why some do write
N o country hath so short a night
A s England hath in summer.

One of the most ancient and remarkable acrostics is the phrase in Greek, 'Jesus Christ, the Son of God, the Saviour,' the initial letters of which form the word *ichthys*, 'fish,' to which a mystical meaning was attached (see SYMBOL). In Hebrew acrostic poetry, the initial letters of the lines or of the stanzas were made to run over the letters of the alphabet in their order. Twelve of the psalms of the Old Testament are written on this plan. The 119th Psalm is the most remarkable. It is composed of twenty-two divisions or stanzas (corresponding to the twenty-two letters of the Hebrew alphabet), each stanza consisting of eight couplets; and the first line of each couplet in the first stanza beginning, in the original Hebrew, with the letter *aleph*, in the second stanza with *beth*, &c. The divisions of the psalm are named each after the letter that begins the couplets, and these names have been retained in the English translation. With a view to aid the memory, it was customary at one time to compose verses on sacred subjects

atter the fashion of those Hebrew acrostics, the successive verses or lines beginning with the letters of the alphabet in their order. Such pieces were called *Abecedarian Hymns.*

Acrote'rion (Gr., 'the summit'), a term for a statue or other ornament placed on the apex or at one of the lower angles of a pediment. Some understand by acroterion, the pedestal on which such ornament stands.

Act has various technical meanings, legal and other. The phrase 'act in the law' means generally an act which is fitted and designed to have a distinct legal effect. It includes a document in writing, as when a person executing a legal instrument declares it to be his *act and deed.* Or it may be the record of an act or proceeding of a public nature, as an Act of Parliament (q.v.). This use of the word is derived from the Romans.

ACT OF BANKRUPTCY, in English Bankruptcy Law, is any act which subjects a person to be proceeded against as a bankrupt. Such acts are equivalent to the marks of notour bankruptcy in Scots law. See BANKRUPTCY.

ACT OF GOD is a legal expression, and signifies any occurrence not caused by human negligence or intervention, such as storms, lightning, tempests, the consequences of which no party under any circumstances (independently of special contract) is bound to make good to another. The chief applications are in the law of carriage of goods, where Act of God is an exception to the liability of the carrier, and in the law of contract, where Act of God often excuses from performance.

In the United States, an act signifies something done for which the person doing is responsible; something done by an individual in his private capacity, or as an officer; or by a body of persons, as an association, corporation, legislature, or court. It includes not only physical acts, but also decrees, orders, resolutions, and laws. An act indicates intention. In criminal matters, an act does not make the actor criminal unless the intention was criminal. An act is also an instrument in writing to verify facts. A public act is one that has public authority, made public by authority, or attested by a public seal; one pertaining to the whole community, while a private act operates upon particular persons and private concerns.

Act, in the Drama, is a distinct section of a play, in which a definite and coherent part of the plot is represented. It is generally subdivided into smaller portions called *scenes,* and its conclusion is properly marked by a fall of the act-drop or curtain. As every dramatic plot naturally divides itself into three parts—the exposition, the development, and the conclusion or catastrophe—a division into three acts would seem most natural, and has accordingly been adopted in modern comedies. But it has been found inconvenient to inclose extended plots in such limits, and since the earliest days of tragedy, *five* acts have generally been considered necessary for its satisfactory development.

Act of Congress. See CONGRESS.

Act of Parliament. See PARLIAMENT.—For the Acts of Settlement, of Toleration, of Uniformity, and the Test Acts, see SETTLEMENT, TOLERATION, UNIFORMITY, and TEST ACTS respectively.

Acts of Sede'runt, ordinances of the Court of Session or supreme civil court in Scotland, made originally under authority given by King James V. in 1532, and ratified by the Scots Act, 1540, chap. 93, whereby the judges are empowered to make such rules or ordinances as may be necessary for the regulation of legal procedure and the expediting of justice. The court passed a great number of acts prescribing the forms of process in both superior and inferior courts. Acts of parliament frequently allow or direct the Court of Session to make rules in the form of Acts of Sederunt with a view to carrying out the statutory provisions. In certain cases the rules are laid on the table of parliament, and, if not rejected by parliament, have the authority of an act of parliament. The rules in election petitions, the fees of law-agents and burgh registrars, the examination of law-agents, and other matters are regulated by Acts of Sederunt. The Report of the Scottish Judges to the House of Lords in 1810 shows that this power of regulation was formerly extended to legislation by the judges; but no such power is now claimed. In 1913 the Court of Session passed a codifying Act of Sederunt consolidating and amending previous acts, and repealing all inconsistent therewith.

Acts of the Apostles, the fifth book of the New Testament, from which we derive most of our knowledge of the history of the apostolic age. The book commences with an account of the earliest Christian community at Jerusalem, and concludes with a brief reference to the visit of St Paul to Rome. It has often been suggested that 'From Jerusalem to Rome' would be a more fitting title for the book, since it would more aptly describe its contents. The chief problems connected with the book are those of *authorship, motive, date,* and *historical value.* On the question of *authorship,* the investigations of Harnack have done much to re-establish the traditional view that it was the work of Luke 'the beloved physician.' Harnack lays stress on the passages written in the first person plural—the 'we-passages,' as they are called—and adduces evidence to prove that the rest of the book is the work of the same hand. *Motive.*—Modern scholarship has rejected the extreme forms of the 'tendency-theory' advocated by Baur and Zeller. The main motive of the book was historical—to supply information to Theophilus, who was probably a Roman official. Incidentally, however, the writer attempts to use the story as an encouragement to the Christians of his own day, and to show by use of illustrations that the Roman empire had in the earliest period always been a protector of the Christian religion. *Date.*—Harnack has revived the theory that the book was written almost immediately after the point at which the narrative breaks off—i.e. about 62 A.D. Otherwise, he argues, the abrupt ending of Acts seems inexplicable. Most modern scholars, however, seem to prefer a date about 80 A.D.; while some, on the ground that certain passages seem to imply the use of Josephus, date it as late as 100. *Historical Value.*—The investigations of Sir W. Ramsay have demonstrated the remarkable accuracy of the geographical and historical details in the second part of Acts. The description of the status of the civic officials in each town has been proved to be true by the evidence of inscriptions, &c. In the earlier chapters, however, the character of the narrative appears to be less trustworthy. The account of the tongues at Pentecost seems to conflict with the statements of the Epistles, and many scholars think that the references to Theudas and Judas in Gamaliel's speech are an anachronism.

See Harnack, *Luke the Physician;* Ramsay, *St Paul the Traveller;* Chase, *Credibility of Acts;* Zeller, *Acts of Apostles Critically Examined* (1876); Commentaries by Wendt (in German), Rackham (Westminster Commentaries), Knowling (Expositor's Greek Testament), Bartlet (Century Bible); Andrews (Westminster New Testament).

Actæa. See BANEBERRY.

Actæ'on, the hunter, who, having surprised Diana bathing, was changed by the goddess into a stag, and so torn to pieces by his own dogs.

Acta Sanctorum (Acts of the Saints), the collective title usually given to various ancient works on the saints and martyrs, both those of the Greek and Roman Catholic churches, but now applied especially to one great collection begun by the Jesuits in the 17th century, and continued by the Bollandists (q.v.). For other collections, see SAINT, MARTYR.

Actinia. See ANEMONE.

Actinism (Gr. *aktis*, 'a ray of sunlight') is a term whose signification has varied considerably. It seems to have been invented by Sir J. Herschel (about 1824), and with him it was used to express the heating-power of sunlight. His Actinometer was employed for the same purposes as the Pyrheliometer (q.v.). Later the term was applied to the property—which certain rays of light (alone) appeared to possess—of decomposing chemical compounds (see SPECTRUM and PHOTOGRAPHY). Recent discovery has proved that there is no special class of actinic rays, it being found possible to utilise any of them photographically by proper physical and chemical processes. See HEAT.

Actinium, a name given to a radio-active element which Debierne separated from pitchblende (before the discovery of radium), and which he held to be responsible for the radio-activity of impure thorium. See RADIUM.

Actinolite, a calcium-magnesium-iron Amphibole (q.v.) generally occurring in columnar or fibrous masses of greenish colour. It may be considered a variety of Tremolite (q.v.).

Actinomyco'sis, a disease of cattle long since noted, but for many years confounded with tubercle or sarcoma. In 1877 Bollinger of Munich showed that little yellow grains are always present, consisting of a minute fungus, with its mycelium arranged in a radiate manner. To this fungus he gave the name Actinomyces; and further observation has confirmed his view that it is the cause of the disease (ray-fungus). It is most common in cattle, occurs also in pigs, and (rarely) in man. It consists of tumours, sometimes of large size, formed of inflammatory material deposited round numerous grains of the fungus. They frequently suppurate and break down. In cattle they occur usually in the jaws, mouth (woody tongue), and stomach; in man in the neck, lungs, and adjacent parts.

Actinozo'a (Gr. *aktis*, 'a ray,' and *zōon*, 'an animal'), one of the three classes of Cœlenterates, including sea-anemones, dead-men's fingers, corals, &c. Like all Cœlenterates, they possess a central mouth and digestive cavity, and are provided with Stinging Cells (q.v.); but they are distinguished from the other two classes (Hydrozoa and Ctenophora) by the possession of a turned-in mouth-tube, forming a stomach region distinct from the body-cavity, and by the presence of a definite number of radial partitions extending from the inner tube to the body-wall. They are provided with tentacles round the mouth, and live either isolated or in colonies. The generative products are always formed on the cross partitions or mesenteries above referred to. The Actinozoa include two orders—Alcyonaria or Octacoralla, with eight tentacles; and Zoantharia or Hexacoralla, with tentacles in sixes. Of the former, Alcyonium, or dead-men's fingers, is a convenient type; and the sea-anemone is a familiar representative of the latter, to which the vast majority of corals also belong. See ALCYONIUM, ANEMONE, CORAL.

Action, in its large sense, means a judicial proceeding before a competent tribunal for the attainment of justice; and in this sense it is applied to procedure, whether *criminal* or *civil*. In its more limited acceptation it is used to signify proceedings in the *civil* courts, where it means the form prescribed by law for the enforcement of a right. Thus in England the word is defined by the Judicature Act, 1873, as a 'civil proceeding commenced by writ, or in such other manner as may be prescribed by rules of court.' The procedure in actions in the High Court of Justice is mainly regulated by the Judicature Acts of 1873 and 1875, and by the rules of the Supreme Court, which are made by the judges under powers conferred on them by these acts. The High Court of Justice has all the powers of a Court of Common Law and a Court of Equity; and the rules of procedure formulated for actions in that court have in various ways assimilated the common law and the equity procedure, selecting the good points of both. Criminal proceedings in the King's Bench Division which are commenced by information or indictment are not 'actions;' nor can that term properly be applied to matters coming before the court on what are called 'motions,' which are mere summary applications made to the court. In Scotland the formal distinction between law and equity never obtained. In certain civil actions the Court of Session has exclusive jurisdiction; in certain cases its jurisdiction can be exercised only in the way of review. But the great majority of civil actions may in Scotland be brought in the first instance either in the Court of Session or in the Sheriff Court. Actions in Scotland were never confined to the same rigid *formulæ* in original writ and subsequent pleading as in England. Now, however, there is no very substantial difference between the course of an action in England and in Scotland. The first step is to bring the defending party into court by service of a summons; the next to ascertain by a record or adjusted pleadings what is the question at issue; the next to ascertain by argument, evidence, or both which party is in the right—a judgment on a question of law being generally subject to appeal, while the verdict of a jury on a matter of fact is generally final. In England, under the Judicature Acts, the defending party has a much larger power of bringing forward a counter-claim than in Scotland, and can even obtain decree in his favour if the counter-claim exceeds the original claim. Every action includes many incidental matters, such as motions to recover documents, to sist new parties, to amend, &c. The expenses of an action are generally ordered to be paid by the losing party, subject, however, to audit or taxation by an officer of court. See COMMON LAW (COURTS OF), and EQUITY.

Actium, a promontory on the west coast of Greece, at the entrance of the Ambracian Gulf, memorable for the naval victory gained near it by Octavian (afterwards the Emperor Augustus), over Mark Antony and Cleopatra, which decided the fate of Rome and of the world, 2d September 31 B.C. The two armies were encamped on the opposite shores of the gulf. Octavian had 80,000 infantry, 12,000 cavalry, and 250 ships of war; Antony, 100,000 infantry, 12,000 cavalry, and 500 ships. Antony's ships were large, and well provided with engines for throwing missiles, but clumsy in their movements; Octavian's were smaller and more agile. It was the advice of Cleopatra that decided Antony to rest the issue on a sea-fight. The battle continued for some hours undecided; at last, Agrippa, who commanded Octavian's fleet, succeeded, by a skilful manœuvre, in compelling Antony to extend his line of battle, the compactness of which had hitherto resisted all attempts of the enemy to break through. Cleopatra, who was stationed behind Antony's line, in terror took to flight with her sixty ships, and Antony at once flung away the empire of the world, and recklessly followed her with a few of his ships. The deserted fleet continued to resist bravely for some time, but was finally vanquished.

Acton, a borough of Middlesex, just beyond the western boundary of the county of London, whose population (61,314 in 1921) more than doubled between 1891 and 1911.—ACTON BURNELL is a parish 8 miles SE. of Shrewsbury, with the ruins of the castle where, in 1283, the parliament was held which passed the 'Statute of Merchants.'

Acton, SIR JOHN FRANCIS EDWARD (1736–1811), minister of Ferdinand IV. of Naples, was the son of an English physician, and was born at Besançon. Acquiring distinction in the naval service of Tuscany, he became admiral and generalissimo in that of Naples, and soon managed the entire administration. His measures, able but arbitrary, ultimately caused a reaction against the royal family of Naples, and in favour of the French party; and he fell from power in 1806.—His grandson, JOHN EMERICH EDWARD DALBERG-ACTON, LORD ACTON (1834–1902), was born at Naples, and succeeded his father as baronet in 1837. He was educated at Oscott under Cardinal Wiseman, and at Munich by Dr Döllinger, whose views he zealously espoused, distinguishing himself in Rome in 1870 by his hostility to the dogma of papal infallibility. He sat in parliament for Carlow (1859–65), and was raised to the peerage by Mr Gladstone in 1869. Leader of English Liberal Catholics, he was for a time editor of the *Home and Foreign Review*, and afterwards of the *Weekly Chronicle* and *British Quarterly;* but it was rather by his universal repute as a scholar of singular learning and breadth of mind than by his writings on the Vatican decrees (1874), Wolsey (1877), German Schools of History (1886), and other occasional publications, that he had shown himself exceptionally well qualified to hold the Cambridge chair of History as Seeley's successor (1895). His inaugural lecture on *The Study of History* expounded the high and deep view he took of the subject. The inherent worth and interest of humanity was his leading thought; the course of history was for him a philosophy of history. His erudition was vast and his insight profound. But his lofty ideal of fastidious accuracy limited his productiveness. No scholar of anything like his learning wrote or published so little; perhaps his chiefest bequest to posterity was his planning the great *Cambridge Modern History*. His enormous library, purchased after his death by an American millionaire, and presented to Lord Morley, found an appropriate resting-place in the university of Cambridge.

See *Lord Acton and his Circle*, by Cardinal Gasquet (1906); his Lectures on History (1906); *Freedom and Other Essays*, and another volume of Essays (1907).

Actuary, a word that in England, like *actuarius* in ancient Rome, once meant the clerk or registrar who recorded the *acta* or business of public bodies—as it still does in the convocation of the province of Canterbury. It was also used for a notary, and till the 19th century for the managing secretary or accountant of a company. Now it means a member of the profession whose calculations supply the principles of life assurance, annuity, and reversionary business; the actuary's functions are the application of the doctrine of probabilities to the affairs of life. The Institute of Actuaries of Great Britain and Ireland was founded in 1848; the Faculty of Actuaries in Scotland in 1856; the Actuarial Society of America in 1889. See ANNUITY, INSURANCE, PROBABILITIES.

Acupressure, a mode of arresting hemorrhage from cut arteries, introduced by Sir James Y. Simpson. It consists in the insertion of a needle through the tissues on both sides of the bleeding vessel, so that the elasticity of the tissues, aided sometimes by a wire firmly looped round the projecting ends of the needle, presses the artery against the needle and closes its tube. It is now rarely used; and only under special circumstances. Acupressure has also occasionally been used in the treatment of Aneurism (q.v.).

Acupuncture (Lat., 'pricking with a needle') is a very ancient remedy, and one practised extensively in the East, for the cure of headaches, lethargies, &c. In Europe it is principally employed to relieve neuralgic pains, and those of chronic rheumatism. Steel needles are made use of, about three inches long, and set in handles. The surgeon, by a rotatory movement, passes one or more to the desired depth in the tissues, and leaves them there from a few minutes to an hour. Their insertion is accompanied by no pain, except the first prick—a fact the quacks of the 16th century did not fail to take advantage of. According to Jerome Cardan, they travelled from place to place practising acupuncture, and before inserting the needle, they rubbed it with a peculiar kind of magnet, either believing or pretending that this made the operation painless. The relief to pain afforded by this simple operation is sometimes astonishing, and the wounds are harmless if care be taken to avoid large vessels. Needles protected except at their points by insulating material are sometimes used as conductors of the galvanic current to deep-seated parts. For the use of hollow needles in the administration of medicines, see HYPODERMIC INJECTION. See also NEURALGIA.

Ada, a town of the Bachka (Bács-Bodrog), on the river Theiss, a trading town and import station for steamers; pop. 12,500.

Adagio (It.), a slow or very slow movement or measure of time in Music. In the more extended compositions of orchestral or chamber music, the second or third *movement* is generally marked *adagio*, and serves as a contrast to the rapid and energetic movement of the preceding and following parts of the sonata or symphony. The distinctive feature of the adagio being its power of expression, it affords the most direct means to the composer of manifesting his individuality of feeling. The finest specimens of the adagio are found in the works of the old masters, above all in Beethoven. In recent works, our composers have generally succeeded better in their rapid movements than in the adagio (see SYMPHONY).

Adal is the name of the flat and barren country lying between the Abyssinian plateaux and the Red Sea, from Massowa to the Bay of Tajurra, its greatest width being 300 miles. The native tribes are of the same stock as the Danakil, and are Mohammedans.

Adalbert, ST, the apostle of the Prussians, was a native of Prague, and was chosen its bishop in 982. His austerity irritated the lawless and but recently converted Bohemians, and he was obliged to flee from his diocese. Soon after his return, he left it anew to carry the gospel to the Hungarians. He afterwards preached without much success to the heathen Poles and Prussians, and was murdered by the latter, 23d April 997. His body was buried in the cathedral at Gnesen, and afterwards carried to Prague; and here, in 1880, his bones were discovered in a vault and re-interred in the cathedral.

Adalbert, a great German ecclesiastic, born of a noble family about 1000, was appointed Archbishop of Bremen and Hamburg in 1045, and papal legate to the north in 1053. He soon extended his spiritual sway over Scandinavia, and carried Christianity to the Wends. In 1063 he became tutor of the young Henry IV., and soon, spite of the opposition of the nobles, ruled over

the whole kingdom. His ambitious mind now conceived the design of founding a great northern patriarchate, which should vie with the Roman curia itself; but he died too soon for his vast design, at Goslar, March 16, 1072.

Adalia, anciently *Attalia*, a growing seaport on the south coast of Asia Minor, at the head of the Gulf of Adalia. Pop. 30,000.

Adam and **Eve,** the names of the first pair of human beings in the account of the creation given in the book of Genesis. 'Adam' is strictly a generic name, applicable to both man and woman, as used in Genesis, chapter i.; but it came to be a proper name used with the article, as in chapters ii., iii., and iv. The origin of the name is uncertain, but is usually connected with the Hebrew root *Adam*, 'to be red.' It is often derived from *Adamah*, 'the ground,' but this is taking the simpler from the more developed form. The Assyrian equivalent is *Adamu*, 'man,' used only in a general sense, not as a proper name. This is connected by Sir Henry Rawlinson and Professor Sayce with *Adamatu*, 'red skins,' the Assyrian word by which the dark-skinned Accadians of primitive Babylonia are designated in the bilingual tablets. Eve is the Hebrew *Havvah*, which name, according to Gen. iii. 20, Adam gave her as the 'mother of all living.' Literally the word means 'life.'

The early part of Genesis contains two somewhat different accounts of the creation of Adam. In the earlier account (i. 26-30), the creation of man and woman is given after the creation of the animals; in the second account (chapter ii.), the creation of Adam is mentioned before that of the animals, and the forming of Eve afterwards. The first narrator is commonly called the Elohistic, from his use of the name *Elohim* for 'God;' the second, the Jehovistic, from his using the name *Jehovah Elohim*. The Elohistic narrator simply states that God created man in his own image. Man is created at the close of the six days' work as the lord of the whole lower world, for whom all things are made. The Jehovistic narrator gives a detailed account of Paradise, the original sin of Adam and Eve, their subjection to the curse, and expulsion from Eden (q.v.). It is, in Ewald's phrase, the 'history proper of the creation of man.' The first condition of Adam and Eve is one of innocent simplicity. They are placed in Eden, where they are allowed to taste freely of the fruit of every tree save one. Temptation comes from without, through the serpent's persuading Eve that the divine prohibition is really intended to keep human beings from becoming as wise as God. Eve yields to the temptation, and leads Adam also into her sin; and thus the moral consciousness of man awoke, and spiritual death passed upon mankind. Adam and Eve are then driven out of Paradise, and prevented by the cherubim and a flaming sword which turned every way, from returning 'to take also of the tree of life, and eat, and live for ever.' Adam lives 930 years; has three sons, Cain, Abel, and Seth, then sons and daughters.

Such is the form of the story which has usually been interpreted by orthodox Jews and Christians as a narrative of literal history, notwithstanding many difficulties about the anthropomorphic details and the admitted uncertainty of the point where the literal ends and the figurative begins. Many of the later Jews explained the story as an allegory. Philo, the foremost writer of the Alexandrian school, explains Eve as the sensuous part, Adam as the rational part, of human nature. The serpent attacks the sensuous element, which yields to the temptation of pleasure, and next enslaves the reason. Clement and Origen adapted this interpretation somewhat awkwardly to Christian theology. Augustine explained the story as history, but admitted a spiritual meaning superinduced upon the literal; and his explanation was adopted by the Reformers, and indeed generally by the orthodox within the Romish and the various Protestant churches alike. More modern critics have sought to separate the kernel of history from the poetical accretions, and attribute the real value of the story, not to its form, but to the underlying thoughts. Martensen describes it as a combination of history and sacred symbolism, 'a figurative presentation of an actual event.' The narrative may be regarded as embodying the philosophy of the Hebrew mind applied to the everlasting problem of the origin of sin and suffering; a question the solution of which is scarcely nearer us now than it was to the primitive Hebrews. It is not the form of the story which is material here, but the substance and the meaning; and the elemental truth of the fall of man by misuse of his free-will remains a religious fact, apart altogether from the historical form in which the fact is stated. In the Pauline theology Adam stands as the covenant head or federal representative of the whole human race in contradistinction to Christ, 'the second man,' 'the last Adam.' See FALL.

Egyptian, Babylonian, and Persian accounts.—The fundamental ideas of pantheism and emanation, which formed the basis of the great religions of the ancient world, were perfectly consistent with a vague theory of the origin of man, which explained him as having issued somehow from the very substance of divinity itself by a kind of spontaneous generation—a development of the chain of emanations—rather than as the result of a free act of a creative will. Such is the account in the *Sanchoniathon*, a fragment of a Phœnician cosmogony that has reached us in a Greek version. Egyptian accounts explain that the fertile slime left by the Nile, under the vivifying influence of the heat of the sun's rays, sprouted into the bodies of men; or as expressed in mythological form, men sprung from the eye of the sun-god. This emanation produced the material body, but a later demiurgic process moulded the form to beauty and communicated to it a soul. Various nations were thus formed by different goddesses: the Egyptians—the highest race in the world—were moulded by the supreme demiurge, Khnoum. One very detailed Babylonian account of the creation is preserved in the Greek of Berosus (q.v.). According to it there was a time when there was nothing but darkness and an abyss of waters, inhabited by a monstrous brood of composite creatures, over which presided a woman named Omoroca ('the sea,' *Tiamat*). Bel cut this woman asunder, making of her lower half the earth, and of her upper half the heavens, while he destroyed all the creatures within her. He next cut off his own head, on which the other gods kneaded the blood as it gushed out with earth, and from it formed men. Hence it is that they are rational and partake of divine knowledge. Next he formed, in the same way, the animals, then the stars, the sun, the moon, and the five planets. Here, leaving out the polytheistic element, the facts follow the same order as in the narrative of the Jehovistic author of Genesis.

Another account, deciphered from the cuneiform inscriptions, has a striking resemblance to the story in the first chapter of Genesis, but it is questioned by Sayce whether this account was translated into Assyrian from an older Accadian document, or in its present form is older than the 7th century B.C. Unfortunately only portions of it exist. It would appear that in these inscriptions the events of each of the days' work were recorded on a special tablet,

and that the numbers of the tablets generally followed the same order as the days of creation in Genesis. Thus, the first, which gives an account of Chaos and the generation of the gods, corresponds closely with the first two verses of the first chapter of Genesis, even to the same word being used in both narratives as the name of the *Chaos*. The fifth tablet, giving the creation of the heavenly bodies, is the most recognisable portion, and is closely parallel to the fourth day of creation in Genesis; while the seventh corresponds with the sixth day. Another tablet refers to the creation of man, ascribing it to Hea, as in all the references in other inscriptions. An early tablet from Nippur, now in Philadelphia, was found by Dr Langdon in 1914 to preserve part of a Sumerian hymn to the creatress Nimtud, giving the story of the fall and the flood. Noah, or Tagtog, a gardener, is cursed by Nimtud for eating of the cassia tree. In Babylonian monuments the serpent frequently occurs; and from his epithets is evidently an embodiment of moral evil. An archaic Babylonian gem represents a tree, on either side of which are seated a man and woman, with a serpent behind the latter, and their hands are stretched out towards the fruit that hangs on the tree; but Schrader warns us that here there is not the slightest indicated reference to what constitutes the specific feature of that narrative—the presentation of the fruit by the woman to the man. The palm may be recognised as the prototype of the 'sacred tree' as represented on the Assyrio-Babylonian monuments. Somewhat similar mystic trees were the Haoma of the Iranians, and the Soma in India.

The religion of Zoroaster is the only one of the ancient religions other than the Jewish which ascribes the creation to the free-will of a personal god, distinct from primordial matter. Ahuramazdâ, the good and great god, creates the universe and man in six successive periods of a year. The first man is Gayômaretan. In the Pehlevi *Bundeĥesh*, the cosmogony goes further. Here both a man type and a bull type are formed, who live for 3000 years on the earth, until the latter is destroyed by Angrômainyus, representing the evil principle. Next the man also falls, but from his body after forty years springs a stalk, from which blooms a creature of double body, both male and female, which Ahuramazdâ divides into two, and so forms Maschya and Maschyâna, the couple from whom descend the whole human family.

It was a common opinion that man was created both male and female in one body, and that the two sexes were separated to form man and woman. This is taught by many of the Rabbis, and is suggested by Aristophanes in the *Symposium* of Plato, to explain the passion of love, which is merely a craving of the incomplete and imperfect for its original completeness and perfection. Lenormant endeavours to show that this is borne out by Gen. i. 28, and chap. v. 2, and the interpretation has the authority of Jewish tradition, as well in the Targums and Talmud, as in scholars like Moses Maimonides, and Eusebius of Cæsarea.

Greek, Polynesian, Zulu, and other accounts.—An ancient Greek account represents Prometheus as making the first man out of earth, or clay and water, and then quickening him with fire stolen from heaven; but earlier accounts limit his work to the latter function, and make men spring up out of the soil. Hesiod describes man in his primitive state as free from sickness and evil before Prometheus stole fire from heaven, and Pandora, who corresponds to Eve, brought miseries to the earth. Prometheus gives man the capability of knowledge; his daring theft is for man the beginning of a fuller and higher life. Æschylus regards Prometheus as the representative of humanity, led into misery by his self-will, until he submits to the higher will of God. This corresponds with the story of Genesis, save that in the latter the spiritual features are clearer and more distinct.

In Scandinavian mythology, the gods draw the first men from the trunks of trees. In many primitive mythologies, the first man is synonymous with the deity, himself his own creator. The theory of family manes, carried back to tribal gods, leads us naturally upwards to a divine ancestor, or first man. Among the Polynesians, men are sprung from the divine Maui, the Raratongan Tiki, the Tii of the Society Islands, whose son Taata ('man') precisely represents a Polynesian Adam, the ancestor of the human race. In the mythology of Kamchatka, one of the sons of Kutka, the creator, is Haetsh, the first man, who after his life on earth descends into Hades to be lord of the under world. The Brazilian tribes refer their origin to Tamoi, the grandfather, the first man, who after living on earth and teaching men to till the soil, ascended to the sky, there to receive the souls of his descendants as they die. The Hindu Yama is not only the first created man, but the first who died, the 'first to show us the way when our course is run, and our sun sets in the far west.' In later Indian theology, he becomes also the awful Judge of the dead, who assembles the souls of men in a house appointed to them for ever. The supreme god of the Dacotah Indians is the creator Unkayhee, who after he had finished the making of the world, took one of his own divine offspring, and grinding him to powder, sprinkled it upon the earth. This produced many worms which matured into infants to become full-grown Dacotahs. Similarly, the Jouskeha of the Iroquois was at once creator of the world and father of the human race; and the gods of the Quiches of Guatemala, Tohil, discoverer of fire, Avilisa and Kacavitz, were apotheosised men, who were actual progenitors as well as ancestral deities. The Zulus carry their worship of the manes of the dead back into tribal deities (Unkulunkulu), and beyond these to the original race deity and creator, the First Man—he who 'broke off in the beginning,' the Old-old-one, the great Unkulunkulu.

Later Jewish, Gnostic, and Moslem Versions.—In Rabbinical and Moslem theology, the first man has hardly more than a place of precedence in Hades or in heaven. Yet even here we find traces of the universal tendency to deify an ideal ancestor; for the Rabbinical Adam is a gigantic being reaching from earth to heaven. Rabbi Jehuda says that as he lay stretched out on earth he covered it completely. Eve's proportions were correspondingly large. When he was first created, the angels stood in awe of him, and all creatures hastened to worship him. Then God caused a sleep to fall on Adam, and removed a portion of every limb. Thus he lost his vast stature, but remained perfect in every part. His first wife was Lilith; but she fled from him when Eve was created. At the marriage of Adam and Eve, who were of course endowed with every grace, angels were present, some playing on musical instruments; while the sun, moon, and stars danced together. The happiness of the human pair excited envy among the angels, and the seraph Sammael tempted them, and succeeded in bringing them to their fall. The Targum of Jonathan makes Eve created from the thirteenth rib of Adam's right side; and thus he was furnished with one rib more than any of his descendants. According to the Koran, all the angels paid homage to Adam, except Eblis, who, on account of his refusal, was expelled from Paradise. To gratify his revenge, he tempted them to sin. In the system of the Christian Gnostics,

Adam, the primal man, stands as earthly representative of the Demiurge, and ranks as one of the highest Æons.

Some have tried to establish from the double account of the creation in Genesis that there were two creations of man—the first, a defective race which peopled the whole Gentile world; the second, Adam, from whom the Jews were specially descended. The argument for the pre-Adamite creation will be found in a curious book published in 1655 by Isaac de la Peyreira, a converted Jew, who afterwards, for safety's sake, recanted his errors at Rome.

Science and the Unity of Man.—The question of the unity of man has caused much controversy. The old chronology was set aside when geology and archæology made it manifest that man existed on the earth many thousands of years ago. This discovery removed the chief difficulty of the *monogenists*, who had to account for the great varieties in the present races of men as having sprung from one common stock within a limited period of time. The *polygenists* pointed to the remarkable permanence of type, in spite of the differentiating conditions of climate and circumstance, to prove that such races as the Negroes, Mongolians, and Whites were distinct species—each sprung from a separate origin in its own region. But fuller knowledge of savage man has demonstrated the essential identity in the working of his mind as well as the structure of his body with the most cultured races; and experience has shown that all the present races, in spite of form and colour, are capable of forming crossed races of every combination. Moreover, the modern doctrine of evolution, or the development of species, has confirmed the monogenist theory in insisting against constituting separate species where the differences are moderate enough to be accounted for as due to variation from a single type.

The question of the original unity or diversity of language is not, however, necessarily identical with that of the unity of the human race. For, even allowing mankind to have descended from a single pair, language might not have originated till long after they had passed away; and the formation of language may not have taken place at once, but may have been a gradual process going on for ages. However this may be, the faculty of speech is still one grand mark of distinction between man and the brute; and the fact remains that no anthropoid ape has ever raised himself to the level of articulate-speaking man.

The story of Adam has been a rich subject both in literature and art. It was frequently treated by the medieval painters, and formed the material of many mysteries and other poems. Of more modern works, it is enough to mention the splendid epic of Milton, *Paradise Lost*. Here Adam and Eve are the archetypal man and woman, sketched with outlines that can only be compared for grand simplicity with Michael Angelo's two frescoes in the Sistine Chapel, of Adam and of Eve coming into life.

See Tylor's *Primitive Culture* (1871); Darwin's *Descent of Man* (1871); Haeckel's *History of Creation* (trans. by Ray Lankester, 1876); Peschel's *Races of Man* (trans. 1876); Baudissin's *Studien zur Semitischen Religionsgeschichte* (1876–78); De Quatrefages' *The Human Species* (trans. 1879); Professor Sayce's edition of George Smith's *Chaldean Account of Genesis* (1880); vol. i. (1882) of Lenormant's *Les Origines de l'Histoire d'après la Bible*; Schrader's *Keilinschriften und das Alte Testament* (2d ed. 1883; Eng. trans. vol. i. 1885); Sayce's *Introduction to the Science of Language* (2d ed. 1883); and Lichthal's *Mélanges de Critique Biblique* (1886).

Adam OF BREMEN, an old historical writer, whose work entitled *Gesta Pontificum Hammenburgensium* gives a history of the archbishopric of Hamburg from 788 A.D. to the death of the Archbishop Adalbert in 1072. It has great historical value; besides notices of ecclesiastical affairs, it gives accounts of the northern Slavonic tribes, which the author collected during a visit to the Danish king Svend-Estrithson. Adam was canon and *magister scholarum* at Bremen from 1069 to the time of his death, which took place in 1075.

Adam, ADOLPHE CHARLES, musical composer, was born in Paris on July 24, 1803, and died in 1856. He was professor of Composition in the Paris Conservatoire from 1848, and also contributed considerably to the newspapers. His best works are his comic operas, among which the chief is the *Postillon de Longjumeau*, produced in 1835, which still keeps the stage as a popular work. He was the successor to the style of Boieldieu, but the frequent triviality of his music marks a stage of the decline of French comic opera to the lower level of opera-bouffe.

Adam, ALEXANDER, LL.D., was born near Forres, Elginshire, 24th June 1741. The son of a small farmer, he had to struggle through much hardship in the pursuit of learning; but in 1757 he came to Edinburgh University, and in 1761 obtained the head-mastership of Watson's Hospital, and in 1768 the rectorship of the High School. This post he filled for nearly forty years with distinguished ability and success, raising the reputation of the school beyond what it had ever been before. Scott, Horner, and Jeffrey were among his pupils. In some of his reforms he encountered such opposition as now seems almost fabulous. He published a new Latin grammar (1772), written in English; but the town-council prohibited him from teaching it. His *Roman Antiquities* (1791) was the work which did most to promote his reputation, and for many years was the best manual of the kind in existence. His *Summary of Geography and History* appeared in 1794, his *Classical Biography* in 1800, and his *Latin Dictionary*—an abridgment of a larger work unfinished at his death—in 1805. On 18th December 1809 he died of apoplexy, his last words being: 'But it grows dark, boys; you may go.'

Adam, JEAN, a Scottish poetess, was born near Greenock in 1710, and died in the Glasgow poorhouse in 1765, after a joyless life, first as schoolmistress, then as hawker. Her *Poems* (1734), religious effusions in the Tate and Brady style, by no means support the claim advanced for her to the authorship of 'There's nae Luck aboot the House,' which, with much more likelihood, is ascribed to Mickle. See a long article in *Athenæum* for 27th January 1877.

Adam, ROBERT, a distinguished architect, was born at Kirkcaldy in 1728. His father, William Adam of Maryburgh, Fife, who died in 1748, was also an architect of no mean repute. After leaving Edinburgh University, Robert Adam proceeded in 1754 with Clérisseau, a French architect, to Italy, and thence to Dalmatia, where he made drawings of the ruins of Diocletian's palace at Spalatro. On his return to Britain, in 1762, he was appointed architect to the king. In opposition to the heavy style of architecture then prevalent, he introduced a taste for lightness and decoration, which, however, tended to the opposite extreme of weakness and triviality. In 1768 he was elected member for Kinross-shire. During upwards of twenty-five years, his practice, in partnership with his brother James, was more extensive than that of any other architect. In 1773 the brothers commenced to publish a series of engravings of their chief designs, which was completed by a posthumous third volume in 1822. Robert died in London 3d March 1792, and was buried in Westminster Abbey. In

Edinburgh his principal works are the Register House, and the main block of the University buildings, which last were completed only in 1887 by the addition of a graceful dome. Glasgow owes its Infirmary to him; and London, the Adelphi buildings (so called after the two *brothers*) and the screen to the Admiralty. Other works were Caenwood House, Kedleston Hall, Luton House, Lansdowne House. See books by Swarbrick (1916) and Bolton (1922).—His nephew, the Right Hon. WILLIAM ADAM of Blair-Adam (1751–1839), sat in parliament as a Whig from 1774 to 1811, and in 1816 was appointed chief-commissioner of the Scottish jury court. He was father of JOHN ADAM (1779–1825), Anglo-Indian statesman, of Admiral Sir CHARLES ADAM (1780–1853), and of General Sir FREDERICK ADAM (1781–1853); whilst Sir Charles was father of WILLIAM PATRICK ADAM (1823–81), for six years Liberal 'whip,' and then governor of Madras for the last few months of his life.

Adam's Apple, the popular name given to the projection in the fore-part of the neck formed by the anterior extremity of the thyroid cartilage of the larynx; so called from the notion that it was caused by a bit of the forbidden fruit which stuck in Adam's throat. The same name is applied to the fruit of a variety of the lime with a kind of depression on the surface, in which the Italian peasants see the mark of Adam's teeth. The name is also used for the Forbidden Fruit (q.v.).

Adam's Bridge, a chain of sand shoals 30 miles long, extending from a small island off the Indian coast to one just off Ceylon. It greatly obstructs navigation of the channel. A ferry connects the railways of India and Ceylon.

Adam's Peak, the name given by Mohammedans, and after them by Europeans, to a mountain summit in the south of Ceylon, 7420 feet high (not, however, the highest of the group). The native name is Samanella. The cone forming the summit is a naked mass of granite, terminating in a narrow platform, in the middle of which is a hollow, five feet long, having a resemblance (increased by human agency) to a human footstep. Mohammedan tradition makes this the scene of Adam's penitence, after his expulsion from Paradise; he stood 1000 years on one foot, and hence the mark. To the Buddhists, the impression is the *Sri-pada*, or sacred footmark, left by Buddha on his departure from Ceylon; and the Hindus recognise Buddha as an avatar of Vishnu. Multitudes of devotees, Buddhist, Hindu, and Mohammedan, visit the mountain.

Adamant, a term now used to express any substance of extraordinary hardness, chiefly a rhetorical or poetical word. The name was attached to a supposed stone or mineral, as to the properties of which vague notions long prevailed. It was identified with the lodestone or magnet, and was often used as synonymous with it by early writers. This confusion ceased with the 17th century, but the word for a long time had a currency among scientific writers as a synonym with diamond. The original of the word is the Gr. *adamas*, originally an adjective meaning 'invincible,' afterwards used as a name of the hardest metal, and also applied by Theophrastus to the hardest crystalline gem then known—the emery-stone of Naxos. Sir J. Murray says that the early medical Latin writers (apparently explaining the word from *adamare*, 'to take a liking to,' 'have an attraction for') took the *lapidem adamantem* for the *lodestone* or *magnet* (an ore of iron, and thus also associated with the ancient metallic sense); and with this confusion the word passed into the modern languages.

Adamantine Spar. See CORUNDUM.

Adamawa, an African territory lying between the Cameroons and Bornu. Anglo-German agreements (1885–90), defining the boundaries between the territory of the Royal Niger Company and German Kamerun, divided Adamawa between them, the larger share falling to Germany. Since 1900, when the company's territories were taken over by the British government, the British part of Adamawa, including Yola, the capital, is in northern Nigeria (q.v.). Amid the southern mountains rise numerous streams, the most important being the Benuë (q.v.), which waters the entire province. The people, who are Mohammedans, are active, industrious, and intelligent.

Adamites, a 2d-century Gnostic sect in Africa, who sought to recall the state of innocence men were in before the fall, rejected marriage, and went naked. Part of their doctrines were in the middle ages adopted by some of the Beghards or Brethren of the Free Spirit; especially in Bohemia and Moravia, where Ziska slew large numbers of them.

Adamnan, Columba's biographer, was born about 625, of the race of Hy-Neill, in that part of Ulster which now forms the county of Donegal. Educated at the monastic seminary of Clonard, in his 28th year he joined the Columban brotherhood of Iona, of which, in 679, he was chosen abbot, the ninth in succession to his great kinsman, the founder. In 686 he paid a visit to his friend and pupil, Aldfrid, king of Northumbria, to procure the release of some Irish captives; and during this visit, and another one two years later, he was converted to the Roman views as to the holding of Easter and the shape of the tonsure. Those views he endeavoured to inculcate in Iona, and also in Ireland, which he twice revisited, in 692 and 697; but he failed, at least in Iona, and it is said that mortification at the failure caused his death, which befell on 23d September 704, the day of his translation in old Irish and Scottish calendars. He left behind him a Latin treatise 'On the Holy Places' of Palestine and other countries, dictated, he says, by Arculfus, a Frankish bishop, who, returning from a pilgrimage, had been wrecked on the Western Isles. It is valuable as one of our earliest descriptions of Palestine; and three editions of it were published between 1619 and 1734, and one in 1889 (ed. G. J. R. Macpherson). *Adamnan's Vision,* a professed account of his visit to heaven and hell, is preserved in an Irish MS. of the 12th century, but was certainly written by a later hand (10th or 11th century; see Boswell's *Fis Adamnain*, 1909). A work of surpassing interest that is certainly his is the *Vita Sancti Columbæ*, his Life of Columba. Along with miracles and many stories palpably incredible, this book reveals a great deal of distinct and minute matter concerning the remarkable community to which both the author and his hero belonged. The standard edition, from an 8th century codex found at Schaffhausen in 1845, was edited by Dr Reeves in 1857 for the Bannatyne Club (q.v.), and the Irish Archæological Society, which (with trans.) forms the sixth vol. (1874) of *Scottish Historians.* Most of our knowledge about the early Scoto-Irish Church is comprised in that volume. Another edition of the life is that by Dr Fowler (Oxford 1895).

Adams, CHARLES FRANCIS, an American diplomatist, the son of John Quincy Adams, was born in Boston on the 18th of August 1807. He passed his childhood mostly in St Petersburg and London, graduated at Harvard, studied law, and was admitted to the bar in 1828. He served for five years in the legislature of Massachusetts. He was nominated at Buffalo, in August 1848, for the office of vice-president by the convention of Free-soilers. In 1858, and again in 1860, he was elected to congress for Massachusetts. In 1861 he was

appointed minister to England, where he acquitted himself with credit in the difficult and important controversies that arose between his government and Great Britain during the great civil war in the United States. He resigned this office in 1868, was an arbitrator in the Alabama claims tribunal at Geneva (1871–72), and died 21st November 1886. He published the *Life and Works of John Adams* (10 vols. 1850–56), his *Letters to his Wife*, and the *Diary of J. Q. Adams* (12 vols. 1876–77). There is a Life of him by his son (1900).

Adams, JOHN, the second president of the United States, was born in Braintree, about 10 miles from Boston, in the then British colony of Massachusetts Bay on the 19th of October 1735, old style. He was the eldest son of John Adams, a farmer in comfortable circumstances, and distinguished himself at Harvard College. He at first intended to become a minister, but the orthodox teachings of that day 'drove him from the profession of divinity to that of the law.' After his graduation in 1755, he was master of a school for three years at Worcester, Massachusetts, studying law meanwhile, and was admitted to the bar in 1758. For the practice of the law, he was pre-eminently qualified by these natural endowments—a sound constitution of body, a clear and sonorous voice, a ready elocution and intrepid courage, characteristics which served him in excellent stead in the stormy political career which he was destined to pass through.

In 1768 Adams removed from Braintree to Boston—then a town of about 16,000 inhabitants—where he soon acquired 'more business at the bar than any other lawyer in the province.' Soon after his settlement in Boston, the Attorney-general of the province (an officer of the crown) tendered him the post of Advocate-general in the Court of Admiralty, an offer which his ardent sympathies with the colonists, as against the crown, constrained him to decline. Important questions touching the rights and duties of the colonies under the crown were at this time being freely debated, and Adams is credited with having struck the key-note of the revolution which separated the colonies from the mother-country, by protesting before the governor and council in 1765, against the enforcement of the Stamp Act, and against any right of parliament to tax the colonies without their consent. Although one of the most resolute and prominent of the advocates of the popular cause, he appears never to have countenanced or encouraged those violent excesses of the colonists which ended in coercive measures on the part of the crown; and when, in March 1770, some soldiers stationed in Boston fired on a mob and killed several persons, his sense of duty induced him to imperil his popularity by acting as counsel for the soldiers, who were tried for murder. In the same year the people of Boston elected him a member of the general court (the legislature); but his health failing, he withdrew from public life, and removed his residence, in 1771, to Braintree. Meanwhile he was chosen one of the five delegates from Massachusetts to the first Continental Congress, which met in Philadelphia in September 1774.

Here he found a fit arena for the exercise of those great talents, both for business and debate, which ultimately raised him to the leadership of that body. He proposed and secured the election of George Washington as commander-in-chief of the Continental Army; he carried (May 1776) a resolution that the colonies should assume the duty of self-government; and on the 7th of June seconded a motion made by Richard Henry Lee, of Virginia, that these colonies 'are and of right ought to be free and independent states.' The support on the floor of congress of this motion and of the 'Declaration of Independence' which followed, devolved mainly upon Adams, who, in the face of a sturdy opposition, acquitted himself with such ability as to lead Jefferson to style him 'The Colossus of that debate.'

The public duties which devolved upon Adams after the passing of the Declaration of Independence in congress are reported as something enormous. He was appointed president of the Board of War, and a member of upwards of ninety committees, of twenty-five of which he was chairman. He records that he was kept constantly at work from four o'clock in the morning until ten at night. After months of these incessant labours, he was granted a long vacation in the winter of 1776–7, and finally retired from congress in November of the latter year. He was, however, immediately appointed a commissioner at the court of France, from which he returned in 1779, and took part in a convention to frame a constitution for the state of Massachusetts. In November he again embarked for Europe, armed with powers from congress to negotiate a treaty of peace and commerce with the mother-country (with which the colonies were still at war); but the object of his mission becoming known at Paris, the jealousy of the French ministry was aroused, and through their influence his powers were revoked. He next visited Amsterdam, in an endeavour to interest Dutch capitalists in the cause of his country; and in January 1781 he was authorised to represent the colonies at the court of Holland. Meanwhile a new commission, consisting of Adams and four coadjutors, had been appointed by the American congress to settle the terms of peace between the United States and the mother-country, and on the 3d of September 1783 the treaty was signed. In 1785 Adams was appointed minister to England, a position which he held until he was recalled, at his own request, in 1788. While in London, he published his *Defence of the Constitution and Government of the United States* (3 vols. 1787).

In 1789 he became vice-president of the United States—General Washington being inaugurated president. Washington and Adams were re-elected in 1792; and at the close of their administration in 1796, Adams was chosen president by the Federalists—Thomas Jefferson, the republican candidate for the presidency, becoming vice-president. An administration chiefly noted for fierce dissensions among the leaders of the Federal party, especially for a bitter hostility between Adams and Alexander Hamilton, was followed by the defeat of Adams (who had become a candidate for re-election) in 1800, and the election of Jefferson and Aaron Burr, the democratic candidates, as president and vice-president. Chagrined at his defeat, and burdened with a sense of what he deemed his undeserved unpopularity among the members of his own party, Adams now retired to his home at Quincy, Massachusetts, where he passed the remainder of his life in comparative obscurity. He died July 4, 1826.

See *Works of John Adams*, edited by his grandson, C. F. Adams (10 vols. 1850–1856); *Life of John Adams*, by J. Q. Adams and C. F. Adams (2 vols. 1871); *John Adams* (American Statesmen Series), by John T. Morse, jun. (1885).

Adams, JOHN COUCH, discoverer, simultaneously with Leverrier, of the planet Neptune, was born near Launceston in Cornwall, 1819. He was sent in 1839 to St John's College, Cambridge, where, in 1843, he attained the honour of senior wrangler, and became a mathematical tutor. Soon after taking his degree, he undertook to find out the cause of the irregularities in the motion of Uranus, anticipating, indeed, his own and Leverrier's dis-

covery—that they are due to the influence of a then unknown planet. Leverrier did not commence his researches till the summer of 1845; but on the 10th of November published the results of his calculations, assigning to the unknown planet almost the same place as Adams had done in a paper which he left with the Astronomer Royal at Greenwich Observatory in the previous October, but which he neglected to publish. Leverrier thus acquired a larger share in the honour of the discovery; but the merit of Adams is not less, and the council of the Royal Astronomical Society awarded equal honours to both in 1848. Neptune was actually observed, near the place assigned, by Galle at Berlin in September 1846. In 1858 Adams was appointed to the Lowndean Professorship of Astronomy, Cambridge. He made important researches as to the secular acceleration of the moon's mean motion, on the November meteors, and on other subjects. He died at Cambridge, 21st January 1892. See his *Scientific Papers* (edited by W. G. Adams, with Life by Glaisher, 1896–98), and Professor H. H. Turner's *Astronomical Discovery* (1904).

Adams, JOHN QUINCY, an American statesman, the son of President John Adams, and himself the sixth president of the United States, was born in the parish of North Braintree (now Quincy), in the colony of Massachusetts Bay, July 11, 1767. When eleven years old, he accompanied his father on a diplomatic journey to Paris, and at the age of fourteen became private secretary to Francis Dana, the envoy from the United States to St Petersburg. He was secretary to the commission which negotiated the treaty of peace between the colonies and the mother-country; but when, in 1785, his father received the appointment of minister to the court of St James's, Adams returned to America, and entered the junior class of Harvard College. He graduated in 1787, studied law, and was admitted to the bar in 1790. In 1794 he received from President Washington the appointment of minister resident at the Hague; was afterwards sent to the court of St James's was nominated by Washington as minister to Portugal; and on the accession of the elder Adams to the presidency, was appointed minister to Prussia. In 1802 he was chosen state senator by the Federalists of his district, and in 1803 was elected to the United States senate from Massachusetts. Here he gradually rose into a position of influence, though often jeopardising his popularity with his own party by acting with the opposition.

In 1806 he boldly denounced in the senate the right claimed by the British government of searching and confiscating the cargoes of neutral vessels bound for countries with which the British were at war, and introduced resolutions (which were supported by the republicans) requesting the president to demand the restoration of property so confiscated. This position thoroughly alienated Adams from the Federal party, and the Massachusetts legislature expressing its disapproval of his course by prematurely electing his successor, he promptly resigned his seat in the senate. In 1809 he was appointed minister to St Petersburg by President Madison; in 1814, was chosen a member of a commission to negotiate a treaty of peace between Great Britain and the United States, and in the following year became minister at the court of St James's, where he remained until he was recalled in 1817 to assume the duties of secretary of state under President Monroe. In the latter capacity he negotiated with Spain a treaty for the acquisition of Florida by the United States, and for the settlement of the western boundary of Louisiana; and it is claimed that to him belongs the paternity of that policy which denies the right of interference by European governments in the affairs of the American continents, familiarly known as 'The Monroe Doctrine.'

On the close of Monroe's administration in 1825, Adams was elected president by the House of Representatives—no election having been made by the people. An uneventful administration followed. Failing of an election for a second term, he retired to his home at Quincy, depressed, unhappy, and poor in purse. In 1830 he was elected by the National Republican (afterwards the Whig) party to the lower house of congress, where he became particularly noted as a promoter of the growing anti-slavery sentiments of the Northern States; was ever ready to defend the abstract right of petition, and subjected himself to severe reproaches by constantly laying before the house floods of petitions for the abolition of slavery. One of the ablest of the old school of statesmen, he was returned to each successive congress until his death, which occurred in the Speaker's room of the House of Representatives, February 23, 1848.

His *Memoirs*, comprising portions of his diary (1795–1848), were edited by his son, Charles F. Adams, in 12 vols.; his *Writings* by W. C. Ford (12 vols. 1913 *et seq.*). See Lives by John T. Morse (1882) and W. O. Stoddart (1887).

Adams, SAMUEL, American statesman, was born at Boston, U.S., September 27, 1722, and graduated at Harvard. He was destined for the Congregationalist ministry, but by his father's misfortunes was obliged to engage in business, which he presently exchanged for a collectorship of taxes. He displayed on all occasions an unflinching zeal for popular rights, and in 1765 was elected by the patriotic party a member of the Massachusetts legislature. He played a prominent part as deputy of his native state in the Philadelphia congress, and signed the Declaration of Independence (1776). He took an active share in framing the constitution of Massachusetts, and was for several years president of its senate. He held the office of its lieutenant-governor from 1789 to 1794, and of governor from that time till 1797. He then retired from public life, and died at Boston, October 2, 1802, poor as he had lived. Adams was somewhat narrow-minded and bigoted, both in religion and politics. He was prejudiced against Washington, whose conduct of the war his ignorance of military matters led him to think weak and dilatory. In 1776 he anticipated Napoleon by applying the term, 'a nation of shopkeepers,' to the English. See his Life, by Wells (3 vols. Bost. 1865), and Morse (Bost. 1884).

Adams, THOMAS, a notable Puritan preacher, of whose personal history few details are precisely known. From 1612 till about 1653 he held charges in Bedfordshire, Buckingham, and London. His most notable works are his sermons and his commentary on 2d Peter. Southey called him 'the prose Shakespeare of Puritan theologians.'

Adams, WILLIAM, an English navigator, who was born in 1564 at Gillingham, near Chatham, and who from 1600 till his death in 1620 was resident in Japan, where he was 'in such favour with two emperors as never was any Christian in those parts of the world.' See his Letters in vol. i. of *Purchas his Pilgrimes;* his Log, ed. Purnell (Japan Soc. xiii.); also the Diary of Richard Cocks (1883).

Adams, WILLIAM, was born in 1814, and died in 1848 at Bonchurch in the Isle of Wight, having been an Oxford tutor and clergyman (1837–42). He was author of *The Shadow of the Cross* and three other beautiful 'Sacred Allegories,' as also of *The Cherry Stones*, &c.

Adana, a city of SE. Asia Minor, on the Sihun, 30 miles from the sea, commands the pass of the Taurus Mountains, is on the Bagdad railway-line,

and has cotton-mills. Cotton, cereals, wool, chrome, and copper are local products. In 1909 terrible riots and massacres of Christians took place. The victims were about 2000 in the town and 15,000 to 25,000 in the neighbourhood. Pop. 50,000.

Adanson, MICHEL (1727–1806), born at Aix, left clerical studies for natural history, and at twenty-one went to Senegal, whence after five years he brought back a large collection of botanical specimens. In 1757 he published his *Histoire Naturelle du Sénégal*, and in 1763 his *Familles des Plantes*, in which he endeavoured to give a new form to botany, the classification being based on the similarity of the several organs of the plants; but he could not prevail against the established Linnæan system. An encyclopædia planned by him received little substantial encouragement. During the Revolution he fell into great poverty; afterwards he received a pension.

Adansonia. See BAOBAB.

Adaptation, a term applied in biology to any particular fitness in structure or in function which adds to effectiveness in given conditions. Adaptations are to be seen throughout the whole organism —in the architecture of bone, in the structure of the heart, in protective coloration, in the so-called mechanism which brings about warm-bloodedness, in the distribution of regenerative capacity, in immunity to certain poisons, in the shapes of leaves, in the flower's arrangements which secure cross-fertilisation, and so on endlessly. Sometimes the term is used in reference to the evolutionary process by which the adaptive result has been brought about, whether by the selection of inborn variations (Darwinism) or by the hereditary accumulation of acquired modifications (Lamarckism). See DARWINIAN THEORY, EVOLUTION.

Adda (Lat. *Addua*), a river of Lombardy, rising in the Rhætian Alps, flows through the Lake of Como, traverses Lombardy, and falls into the Po 8 miles above Cremona, after a course of 180 miles.

Addah, a seaport, at the mouth of the Volta, in eastern Gold Coast.

Addams, JANE, born in 1860 at Cedarville, Illinois, has lectured on and greatly promoted social reform, and written on *Democracy and Social Ethics*. In 1889 she and Miss Starr opened the famous Social Settlement of Hull House at Chicago.

Adder. See VIPER, PUFF-ADDER.—The very venomous *Death* or *Deaf Adder* of Australia (*Acanthophis antarctica*) is found in hot sandy districts.

Addington. See SIDMOUTH.

Addis Ababa, conventionally ADIS ABABA, a place which, dating only from 1892, was soon thereafter made capital of Abyssinia by Menelek, stands in the south of Shoa, on the southern slopes of the Entoto range, draining to the Hawash; pop. 50,000. A railway from Djiboutil was completed in 1917.

Addiscombe, a place in Surrey, near Croydon. A mansion here was, in 1812–61, the East India Company's college for cadets.

Addison, JOSEPH, was born on the 1st of May 1672. He was the eldest son of Lancelot Addison, then rector of Milston, in Wiltshire, and afterwards dean of Lichfield, and of Jane, his wife, daughter of Dr Nathaniel Gulston. He was educated at Amesbury, at the grammar-school in Lichfield, and afterwards at the Charterhouse, from which, in his sixteenth year, he passed to Queen's College, Oxford. Having obtained a demyship at Magdalen, he proceeded to his Master's degree in 1693, and in the same year began his literary career with a poetical address to Dryden. Next year appeared his *Account of the Greatest English Poets*, and a translation of the fourth book of the *Georgics*, with an Essay on that poem. Through Dryden, he became acquainted with Jacob Tonson, the publisher, and by him was introduced to Charles Montague and Somers, at whose suggestion, probably, he wrote in 1695 his complimentary *Address to King William*. In 1697 he was elected probationary fellow of his college, and would in the regular course have been obliged to take orders, had not Montague, who wished him to enter political life, prevailed on the president not to insist on the fulfilment of this condition. Through the influence of Montague, he obtained in 1699 a pension from the crown of £300, for the purpose of enlarging his experience by continental travel. He spent four years in France, Italy, Austria, Germany, and Holland, during which period he wrote his *Letter to Lord Halifax*, and made notes for his *Remarks on Several Parts of Italy*, and his *Dialogue on Medals*. He returned to England in the autumn of 1703. His chief patron, Halifax, having been removed by Queen Anne, on her accession, from the Privy Council, he was now without hope of political advancement, and was apparently reduced to a state approaching poverty, when he was invited by the ministry, acting on the advice of Halifax, to commemorate in verse the victory of Blenheim. This was the origin of *The Campaign*, written in 1704, in return for which he received a commissionership of appeal in Excise.

In 1706 he was promoted to be under-secretary of state, first to Sir Charles Hedges, and, after his removal, to the Earl of Sunderland. While acting in this capacity, he produced his opera *Rosamond*, which was performed, but without much success, in April 1706. In 1707 he attended Lord Halifax to the court of Hanover, whither the latter was sent to carry the Act for the Naturalisation of the Electress Sophia. When the Earl of Sunderland was replaced in 1708 by Lord Dartmouth, Addison found himself without employment, but he was almost at once appointed by Lord Wharton, who at that time became lord-lieutenant of Ireland, to the post of secretary. In this year he was also elected member of parliament for Lostwithiel, and on that election being invalidated, was chosen to represent Malmesbury. While he was secretary in Ireland, he formed a warm friendship with Swift, who frequently mentions him with affection in his *Journal to Stella*, and regrets the estrangement which afterwards grew up in consequence of their party differences. He also contributed largely to the *Tatler*, which had been started by his friend Steele in 1709; 41 papers being wholly by Addison, and 34 by him and Steele conjointly. The Whig ministry fell in the autumn of 1710, and Addison had to vacate his appointment, though he was allowed to keep, apparently through Swift's influence, the keepership of the records in Bermingham's Tower, a place worth £400 a year. In March 1711 was founded the *Spectator*, 274 numbers of which, namely those signed with one of the letters C L I O, were the work of Addison.

His fortune was now so much augmented, that in 1711 he was enabled to purchase for £10,000 the estate of Bilton, near Rugby. While he was on his travels, he had written four acts of his tragedy, *Cato*, which his political friends, perceiving that it would be valuable for party purposes, persuaded him in 1713 to finish for the stage. It was acted on the 14th of April 1713, and in consequence of the vehement party-spirit of the times, aroused such enthusiasm, that it kept the stage for thirty-five nights. When the Treaty of Utrecht was signed, Addison, in promotion of Whig interests, attacked its commercial policy in a pamphlet called *The Late Trial and Conviction of Count Tariff*. These party services gave him great consideration with the Whigs, and on the death of Queen Anne in August

1714, he was named secretary to the lord-justices appointed provisionally to administer affairs. After the accession of George I., he became once more secretary to the Earl of Sunderland as lord-lieutenant of Ireland, holding the appointment till August 1715. In this year, a suspicion that he was the author of Tickell's translation of the first book of the *Iliad*, brought him into collision with Pope, who afterwards satirised him in the famous character of Atticus, declaring, in all probability falsely, that he had actually sent the verses to Addison himself. He also wrote his comedy of *The Drummer*, which was acted without success at Drury Lane; and, in order to reconcile the nation to the accession of the House of Brunswick, at the instigation of the government he started the *Freeholder*, which was continued from December 23, 1715, to June 9, 1716. He was soon afterwards made one of the commissioners for trade and colonies, and in August 1716, married Charlotte, Countess of Warwick. A report, in all probability unfounded, as it is inconsistent with the mention of the Countess in Addison's will, says that the marriage was an unhappy one. In April 1717 he was appointed secretary of state, but resigned his post, owing to his failing health, in March 1718. Almost his last literary undertaking was unfortunately a paper-war, on the subject of the Peerage Bill of 1719, with his old friend Steele, whose attack on the bill in a series of pamphlets called the *Plebeian*, was answered by Addison in the *Old Whig*. He was suffering at the time from asthma; dropsy soon after supervened; and he died at Holland House, on the 17th of June 1719, at the age of 47.

Addison's literary genius must be judged from different points of view. As a poet, his capacity is very moderate. *The Campaign* professes to be no more than an unadorned recital in verse of Marlborough's exploits; *Cato* is written with great elegance and correctness, but is wanting in dramatic spirit; the *Letter to Lord Halifax* has many fine verses, particularly in the apostrophe to Liberty. As a light essayist he has no equal, and scarcely a second, in English literature. It was his object to form a sound public taste, and to recover the nation from the distracted intellectual state into which it had fallen after the Restoration, by preserving the morality of the Puritans without their fanaticism, and the elegance of the court without its licentiousness. The noble monument of his success is the *Spectator*, a paper in which the foundations of all that is sound and healthy in modern English thought may readily be traced. As an 'abstract and brief chronicle' of the manners of the time, it is incomparable, and the name of Sir Roger de Coverley alone is associated with one of those creations which are instinctively selected as characteristic of the English genius and language. Addison's criticism does not aim at being profound; but in its sobriety and good sense, it afforded precisely the antidote which the age required against the extravagant conceits and false wit which had found favour with the 17th century. The praise of his prose style has been written by Johnson, and it is not exaggerated; his manner reflects the peculiar character of his humour, a singular grace and breeding being conveyed in sentences full of subtle irony, which are balanced without being formal, and though constructed with apparent simplicity, defy mechanical imitation. See the Life, by Lucy Aikin (1843), and Macaulay's review of it; also the present writer's *Addison* (1884).

Addison, THOMAS, physician, was born near Newcastle in 1793, and graduated in medicine at Edinburgh in 1815. He settled in London, and in 1837 became physician to Guy's Hospital, where he was almost equally eminent as investigator and as clinical lecturer. His chief researches were on pneumonia, phthisis, and especially on the Suprarenal Capsules (q.v.) and the somewhat rare disease of those organs since known as *Addison's Disease*. The discovery of this disease was a piece of sound original work, though of no great practical importance. He also wrote on poisons, on the disorders of females, and, with Dr Bright, *Elements of the Practice of Medicine* (vol. i. 1839). He died 29th June 1860.

Addison's Disease. See SUPRARENAL CAPSULES.

Addorsed, or ADDOSSÉ, a heraldic term signifying turned back to back.

Address, FORMS OF. The following are the correct ceremonious modes of addressing and beginning letters to persons of title or holding offices:

Ambassador, British—Address: 'His Excellency [in other respects according to his rank], H.B.M.'s Ambassador and Plenipotentiary.' Begin: 'Sir,' 'My Lord,' &c., according to rank. Refer personally to as 'Your Excellency.' An Ambassador's wife, when resident abroad, is sometimes, but not very correctly, designated 'Your Excellency.'

Archbishop—'His Grace the Lord Archbishop of ——.' Begin: 'My Lord Archbishop.' Refer to as 'Your Grace.' In formal documents the Archbishop of Canterbury is addressed as 'The Most Reverend Father in God, Randall Thomas, by Divine Providence Lord Archbishop of Canterbury, Primate of all England and Metropolitan;' the Archbishop of York as 'The Most Reverend Father in God, Cosmo, by Divine permission Lord Archbishop of York, Primate of England and Metropolitan.' But an Irish Archbishop appointed since 1868 is only 'The Most Reverend the Archbishop of ——,' unless he happen to be a temporal peer, in which case he is 'The Right Hon. and Most Rev.'

Archdeacon—'The Venerable the Archdeacon of ——.' Begin: 'Venerable Sir.'

Baron—'The Right Hon. Lord ——,' or 'The Lord ——.' Begin: 'My Lord.' Refer to as 'Your Lordship.'

Baron's Daughter—If unmarried, 'The Hon. [Christian name and surname]. If married, 'The Hon. Mrs' [husband's surname]. Begin: 'Madam.' If married to a Baronet or Knight, 'The Hon. Lady' [husband's surname]. Begin: 'My Lady.' If the wife of a peer, or of the son of a Duke or Marquess, address as such.

Baron's Son—'The Hon.' [Christian name and surname]. Begin: 'Sir.' But the eldest sons of Barons in the Peerage of Scotland are usually addressed as 'The Hon. the Master of' [peerage title].

Baron's Son's Wife—'The Hon. Mrs' [husband's surname], or, if necessary for distinction, the husband's Christian name should also be used. Begin: 'Madam.' If the daughter of an Earl, Marquess, or Duke, address as such.

Baroness, either in her own right or her husband's—'The Right Hon. the Baroness ——,' 'The Right Hon. Lady ——,' or 'The Lady ——.' Begin: 'My Lady.' Refer to as 'Your Ladyship.'

Baronet—'Sir [Christian name and surname], Bart.' Commence: 'Sir.'

Baronet's Wife—'Lady' [surname]. Begin: 'Madam.' Refer to as 'Your Ladyship.'

Bishop, Colonial—As Scottish bishop.

Bishop, English—'The Right Rev. the Lord Bishop of London,' or 'The Lord Bishop of London.' Begin: 'My Lord Bishop.' Refer to as 'Your Lordship.' In formal documents a Bishop is 'The Right Rev. Father in God, Arthur, by Divine permission Lord Bishop of London.'

Bishop, Irish, consecrated before 1868—As English bishop.

Bishop, Irish, consecrated since 1868—'The Right Rev. the Bishop of Ossory,' or in case of the Bishops of Meath and Tuam, 'The Most Rev.' Begin: 'Right Rev. Sir,' or 'Most Rev. Sir.'

Bishop, Retired—'The Right Rev. Bishop ——,' or 'The Right Rev. —— ——, D.D.' Begin: 'Right Rev. Sir.'

Bishop, Scottish—'The Right Rev. the Bishop of St Andrews, Dunkeld, and Dunblane,' or 'The Right Rev. Bishop Plumb.' The Bishop who holds the position of Primus is generally addressed 'The Right

Rev. the Primus.' The use of 'Lord Bishop' and 'My Lord' is incorrect.

Bishop, Suffragan—'The Right Rev. the Bishop Suffragan of Bedford.' Begin: 'Right Rev. Sir.'

Bishops' Wives and Children have no titles.

Clergy—'The Rev.' [Christian name and surname]. Begin: 'Rev. Sir.' If son of a Duke or Marquess, 'The Rev. Lord' [Christian name and surname]. If the son of an Earl, Viscount, or Baron, 'The Rev. the Hon.' [Christian name and surname] is beginning to supersede 'The Hon. and Rev.'

Companion of an Order of Knighthood—The initials, C.B., C.M.G., C.S.I., or C.I.E., as it may be, are subjoined to the ordinary form of address.

Consul, British—'—— ——, Esq., H.B.M.'s Agent and Consul-General,' 'Consul-General,' 'Consul,' or 'Vice-Consul,' as it may be.

Countess—'The Right Hon. the Countess of ——.' Begin: 'Madam.' Refer to as 'Your Ladyship.'

Dean—'The Very Rev. the Dean of ——.' Begin: 'Very Rev. Sir.'

Doctor—The initials D.D., M.D., LL.D., Mus.D., are placed after the ordinary form of address, as 'The Rev. James Macgregor, D.D.,' 'Thomas Keith, Esq., M.D.' But 'The Rev. Dr Macgregor,' 'Dr Thomas Keith,' are also frequently used.

Dowager—On the marriage of a peer or Baronet, the widow of the previous holder of the title becomes 'Dowager,' and is addressed 'The Right Hon. the Dowager Countess of ——,' 'The Dowager Lady ——.' As more than one Dowager may hold the same title, the term is less used than formerly, and the Christian name is instead coming to be employed as a distinction —e.g. 'The Right Hon. Helen Countess of ——.'

Duchess—'Her Grace the Duchess of ——.' Begin: 'Madam.' Refer to as 'Your Grace.'

Duke—'His Grace the Duke of ——.' Begin: 'My Lord Duke.' Refer to as 'Your Grace.'

Duke's Daughter—'The Right Hon. Lady' [Christian name and surname], or 'The Lady' [Christian name and surname], the surname being that of her husband if married. Begin: 'Madam.' Refer to as 'Your Ladyship.' If married to a peer, she is addressed according to her husband's rank only. This, however, does not hold in the case of peers by courtesy; and a Duke's daughter married to the eldest son of an Earl, after the prefix 'Lady,' sometimes takes her own Christian name, followed by her husband's courtesy title.

Duke's Eldest Son and his Children—The courtesy title is treated as if it were an actual peerage; his eldest son taking the grandfather's third title, and being addressed as if a peer.

Duke's Eldest Son's Wife—As if her husband's courtesy title were an actual peerage.

Duke's Younger Son—'Lord' [Christian name and surname], less correctly 'The Lord' [Christian name and surname]. Begin: 'My Lord.' Refer to as 'Your Lordship.'

Duke's Younger Son's Wife—'Lady' [husband's Christian name and surname]. Begin: 'Madam.' Refer to as 'Your Ladyship.'

Earl—'The Right Hon. the Earl of ——,' or 'The Earl of ——.' Begin: 'My Lord.' Refer to as 'Your Lordship.'

Earl's Daughter—As Duke's daughter.

Earl's Eldest Son, and *Earl's Eldest Son's Wife*—As if the courtesy title were an actual peerage.

Earl's Younger Son and his Wife—As Baron's son and his wife.

Governor of Colony—'His Excellency [ordinary designation], Governor of ——.' Begin according to rank, and refer to as 'Your Excellency.'

Judge, English or Irish—'The Hon. Sir —— ——,' if a Knight, or 'The Hon. Mr Justice ——.' Begin: 'Sir.' On the bench only he is addressed as 'My Lord,' and referred to as 'Your Lordship.'

Judge of County Court—'His Honour Judge ——.' When on the bench, referred to as 'Your Honour.'

Judges, Scottish—See *Lord of Session*.

Justice of Peace in England (not Scotland) by custom referred to when on the bench as 'Your Worship.' (He is not 'Right Worshipful.')

KING.—'The King's Most Excellent Majesty.' Begin: 'Sire,' or 'May it please your Majesty,' or 'Lord —— presents his duty to Your Majesty.' Refer to as 'Your Majesty.'

King's Counsel—append K.C. to ordinary address.

Knight Bachelor—As Baronet, except that the word 'Bart.' is omitted.

Knight of the Bath, of St Michael and St George, or of the Star of India—'Sir' [Christian name and surname], with the initials G.C.B., K.C.B., K.M.G., or K.S.I., added. Begin: 'Sir.'

Knight of the Garter, of the Thistle, or of St Patrick—The initials, K.G., K.T., or K.P., as it may be, are to be added to the address.

Knight's Wife, whether wife of Knight Bachelor, of the Bath, of St Michael and St George, or of the Star of India—As Baronet's wife.

Lord Advocate of Scotland—'The Right Hon. the Lord Advocate.' Usual beginning: 'My Lord,' though 'Sir' is said to be more correct.

Lord Chancellor—'The Right Hon. the Lord High Chancellor.' Begin and refer to according to rank.

Lord Chief-Justice—'The Right Hon. the Lord Chief-Justice of England,' or 'The Right Hon. Sir —— ——, Lord Chief-Justice of England.' Begin, if a peer, according to his degree, otherwise as under *Judge*.

Lord High Commissioner to the General Assembly—'His Grace the Lord High Commissioner.' Begin according to rank as a peer. Refer to as 'Your Grace.'

Lord Justice-Clerk—'The Right Hon. the Lord Justice-Clerk.' Begin: 'My Lord.' Refer to as 'Your Lordship.'

Lord Justice-General of Scotland—'The Right Hon. the Lord Justice-General.' Begin: 'My Lord.' Refer to as 'Your Lordship.'

Lord Justice of Appeal—'The Right Hon. the Lord Justice ——,' or 'The Right Hon. Sir ——.' Begin and refer to as a Judge.

Lord Mayor of London, York, Dublin, &c.—'The Right Hon. the Lord Mayor of London,' or 'The Right Hon. —— ——, Lord Mayor of London.' Begin: 'My Lord.' Refer to as 'Your Lordship.'

Lord Mayor's Wife—'The Right Hon. the Lady Mayoress of ——.' Begin: 'Madam.' Refer to as 'Your Ladyship.'

Lord of Appeal in Ordinary, and his Wife—As Baron and Baroness. Their children have no title.

Lord of Session in Scotland—'The Hon. Lord ——.' Begin: 'My Lord.' Till 1965 without any title, their wives have now the style of 'Lady.'

Lord Provost—'The Right Hon. the Lord Provost of Edinburgh,' 'The Right Hon. the Lord Provost of Glasgow.' Begin: 'My Lord Provost,' or 'My Lord. Refer to as 'Your Lordship.' The Lord Provost's wife has no title.

Maid of Honour—'The Hon. Miss ——.' Begin: 'Madam.'

Marchioness—'The Most Hon. the Marchioness of ——.' Begin: 'Madam.' Refer to as 'Your Ladyship.'

Marquess—'The Most Hon. the Marquess of ——.' Begin: 'My Lord Marquess.' Refer to as 'Your Lordship.'

Marquess's Daughter—Like Duke's daughter.

Marquess's Eldest Son—Like Duke's eldest son.

Marquess's Younger Son—Like Duke's younger son.

Mayor of a City—'The Right Worshipful [The Worshipful,' if of a borough] the Mayor of ——.' Address: 'Sir.' Refer to as 'Your Worship.'

Member of Parliament—Add M.P. to ordinary address.

Minister Resident—'—— ——, Esq. [or according to rank], H.B.M.'s Minister Resident, ——.'

Moderator of the Established Church of Scotland—'The Right Reverend the Moderator of ——.' Begin: 'Right Rev. Sir.'

Officers in the Army and Navy—The professional is prefixed to any other rank—e.g. 'Admiral the Right Hon. the Earl of ——,' 'Lieut.-Col. Sir ——, K.C.B.' Officers below the rank of Captain in the Army or Commander in the Navy are more generally addressed by their social, not professional rank, followed by the name of the regiment, R.A., R.E., or R.N., as may be.

Premier—According to his rank.

Prince—If a Duke, 'His Royal Highness the Duke of ——.' If not a Duke, 'His Royal Highness Prince' [Christian name]. Begin, in either case, 'Sir.' Refer to as 'Your Royal Highness.'

Princess—If a Duchess, 'Her Royal Highness the Duchess of ——.' If not a Duchess, 'Her Royal

Highness the Princess' [Christian name]. Begin: 'Madam.' Refer to as 'Your Royal Highness.'

Principal of a Scottish University—When a clergyman, 'The Very Rev. the Principal of ——,' or 'The Very Rev. Principal' [surname].

Privy Councillor—'The Right Hon.,' followed by name or title. Begin and refer to according to rank.

QUEEN—'The Queen's Most Excellent Majesty.' Begin: 'Madam,' or 'May it please Your Majesty.' Otherwise, 'Lord —— presents his duty to Your Majesty.' Refer to as 'Your Majesty.'

Secretary of State—'His Majesty's Principal Secretary of State for the —— Department.'

Serjeant-at-Law—'Serjeant ——,' or 'Mr Sergeant ——.'

Sheriff of London—'The Right Worshipful.'

Vice-Chancellor—As a Judge. Begin: 'Sir.' Address on the Bench as 'My Lord.'

Viceroy of India—As Governor of Colony, *mutatis mutandis*.

Viscount—'The Right Hon. the Lord Viscount ——,' or 'The Lord Viscount ——.' Begin: 'My Lord.' Refer to as 'Your Lordship.'

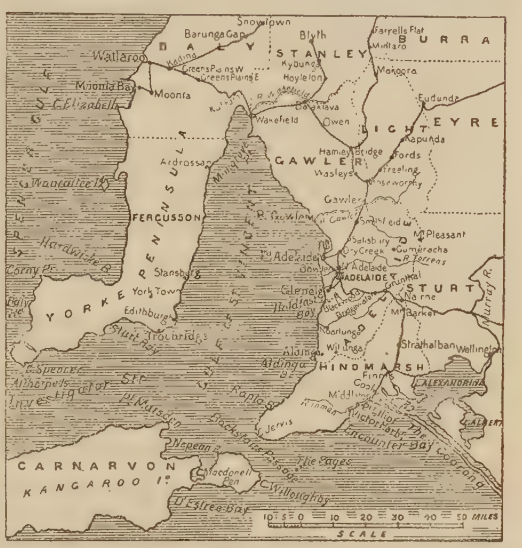
Viscountess—'The Right Hon. the Viscountess ——,' or 'The Viscountess ——.' Begin: 'Madam.' Refer to as 'Your Ladyship.'

Viscount's Daughter, Son, and Son's Wife—As Baron's daughter, son, and son's wife.

In correspondence with equals or personal friends letters are begun less formally—e.g., 'My dear Lord,' 'Dear Lord ——,' 'Dear Sir James.' We are less ceremonious than our ancestors a few generations ago, when letters to the nearest relatives and most intimate friends were begun and ended in the most formal manner. Designations like 'Mrs General ——,' 'Mrs Captain ——,' 'Mrs Dr ——,' which were fifty years ago not uncommon, were always improper. Persons holding offices other than those enumerated are addressed in the usual form, 'Sir,' 'Dear Sir,' or 'My dear Sir,' according to the more or less formal terms on which the writer may be with his correspondent. A firm is addressed 'Gentlemen,' or 'Dear Sirs.'

Adelaer (Norwegian, 'Eagle'), a name of honour given to Curt Sivertsen (1622–75), born at Brevig, in Norway, who greatly distinguished himself in the naval service of Venice against the Turks. He died just after taking command of the Danish fleet for an expedition against Sweden. Frederick III. made him admiral of the Danish fleet, ennobled him, and gave him the name of Adelaer.

Adelaide, capital of South Australia, is situated on the Torrens, an insignificant stream running into St Vincent Gulf. It stands on a large plain which is walled in on the eastern and southern sides by the Mount Lofty range. The first settlement was made in 1836, and named after the queen of William IV. The Torrens separates the town proper (which is enclosed in a belt of park lands) from the residential suburb of North Adelaide; a dam retains in the river-bed at this point enough water for regatta purposes, and four bridges span the long, narrow lake thus formed. The streets are broad and regularly laid out, cross each other at right angles, and are for the most part planted with trees. Among the public buildings are the parliament houses; government offices, post-office, and town-hall; South Australian Institute, with museum, library, and art-galleries; and hospital. The botanical garden, with the botanical garden park, covers more than 120 acres of ground. Adelaide is abundantly supplied with water from reservoirs several miles distant. The chief manufactures are woollen, leather, iron, and earthenware goods; but the prosperity of the city depends on its being the great emporium for South Australia. Wheat and wool account for more than half the export figures; copper ore is also exported, and there is a growing trade in wine. Among educational institutions the most important are the Adelaide University; St Barnabas Theological College, opened in 1881; and two fine public schools, St Peter's College (Anglican) and Prince Alfred College (Wesleyan). Adelaide is the seat of an Anglican and of a Roman Catholic bishop. It is the terminus of the direct telegraph-line to London, *viâ* Port Darwin; it is connected by rail with Broken Hill and Melbourne (and so with Sydney and Brisbane), by the trans-continental railway with Kalgoorlie and Perth, while the Australian government is constructing another transcontinental line which will give com-


Barunga Gap
Snowtown
Blyth
Farrells Flat
Mintaro
BURRA
DALY
STANLEY
Wallaroo
Kadina
Kyoung
Hoyleton
Moonta Bay
Moonta
Wakefield
Owen
Eudunda
LIGHT
EYRE
Kapunda
Hamley Bridge
Fords
GAWLER R.
Ardrossan
Wasleys
Freeling
Gawler
FERGUSSON
Mt Pleasant
Cumeracha
Adelaide
ADELAIDE
Tunnel
STURT
Glenelg
Henley Beach
Marion
Brighton
Edithburgh
Yorke's Town
YORKE
Port Victoria
Port Broughton
Wallaroo
Strathalban
Wellington
Aldinga
HINDMARSH
Finniss
Currency Creek
ALEXANDRIA
Middleton
Victor Harbor
Encounter Bay
Goolwa
Port Elliot
Port Willunga
Normanville
Myponga
Yankalilla
Cape Jervis
Rapid Bay
Port Noarlunga
Port Stanvac
Port Adelaide
Semaphore
Largs Bay
Port Gawler
Port Wakefield
Port Spencer
Port Pirie
Port Augusta
Port Germein
Port Lincoln
Port Kenny
Streaky Bay
Fowler's Bay
Thevenard
Ceduna
Eyre Peninsula
Gulf St Vincent
Spencer Gulf
Investigator Strait
Backstairs Passage
Kangaroo Island
CARNARVON
KANGAROO I.
Macdonnell
Willoughby
D'Estrees Bay
Cape Borda
Cape Jervis
Cape Willoughby
Cape Spencer
Cape Catastrophe
Cape Donington
Cape Bauer
Cape Finniss
Cape Elsey
Cape Hart
Cape Forbin
Cape Carnot
Cape Wiles
Cape Blanche
Cape Adieu
Cape Bouguer
Cape Pasley
Cape Catastrophe

where, since 1787, he had held the office of chief-librarian. His chief works are his *Wörterbuch der Hochdeutschen Mundart* (5 vols. 1774–86), in which he took Dr Johnson as his model; and his *Mithridates oder allgemeine Sprachenkunde* (1806), a work on general philology.

Ademption means that if a testator bequeaths a specific article, or specific property, and before his death the article or property is destroyed or ceases to be part of his estate, either by the act of the testator, or otherwise, then the legatee gets nothing. It is often a question of difficulty to say whether the bequest was really specific. In Roman law ademption did not occur unless it was shown that the testator intended to adeem the legacy. But both in England and in Scotland it is now settled that ademption operates, independently of the intention of the testator, wherever a specific subject is bequeathed and that subject does not remain as part of the testator's estate at the date of his death. A mere change in the name or form of the subject bequeathed does not involve ademption if, despite such change, the thing itself, or substantially the same thing, continues to be part of the testator's estate.

Aden, a peninsula and town on the SW. coast of Arabia, 105 miles E. of the strait of Bab-el-Mandeb, the entrance to the Red Sea. It is in 12° 47′ N. lat., 45° 10′ E. long., and is a British possession. The peninsula is a mass of volcanic rocks, 5 miles in length from E. to W., the highest point being 1776 feet in height. It is joined to the mainland by a narrow, level, and sandy isthmus. The town is on the eastern shore of the peninsula, stands in the crater of an extinct volcano, and is surrounded by indescribably barren, cinder-like rocks. The main crater is known as the Devil's Punch-bowl. Frequently the heat is intense; but the very dry hot climate, though depressing, is unusually healthy for the tropics. The Romans occupied it in the 1st century A.D. Up to the time of the circumnavigation of Africa, it was the chief mart of Asiatic produce for the Western nations. The Portuguese held it for a short time; but in 1838 it had sunk to be a village of 600 inhabitants. The increasing importance of the Red Sea route to India gave Aden great value as a station for England to hold. Maltreatment of shipwrecked mariners led to English interference and fruitless negotiations with the Arab sultan. In 1839, after a few hours' contest, Aden fell into the hands of the British. In its medieval prosperity, Aden had a magnificent system of cisterns for collecting rain-water. They had fallen into utter disrepair; but some of them have been restored so as to be serviceable. The present water-supply depends partly on the distillation of sea-water, and is also drawn from these cisterns, from an aqueduct, and from wells sunk to a depth of 120 to 190 feet in the solid rock: all water must be paid for.

Aden is of very great importance to Britain, both in a mercantile and naval point of view, especially as a great coaling-station; it has a garrison and strong fortifications. The population and resources of the place have rapidly increased since 1838, and the opening of the Suez Canal in 1869 gave it a great impetus. The exports include coffee, gums, spices, cotton, tobacco, grain, hides, sugar. A railway runs from Aden to Lahej and beyond. It is on the cable from Suez to Bombay and to the Cape, and has a wireless station. To provide for its growing population, a considerable territory on the mainland has been added to the peninsula (in all 75 sq. m.), besides a protectorate (1905) of 9000 sq. m.; the settlement, which includes Perim, and is politically connected with Bombay (five days' sailing distant), had in 1921 a population of 54,923. The Kuria Muria islands are attached to Aden. The bulk of the natives of Aden are Arabs and Somalis from Africa, all speaking Arabic. In the settlement there are besides Aden proper, called the Camp, or the Crater (whose population cannot for military reasons be allowed to increase much), two other centres of population—Steamer Point, which is cooler than the Crater; and the outlying town of Shaikh Othman, 10 miles towards the interior.

Adeni'tis (Gr. *adēn*, 'a gland') and LYMPHANGITIS (Gr. *angeion*, 'a vessel') are the terms employed in medicine to indicate inflammation of the lymphatic glands and inflammation of the lymphatic vessels respectively. In most instances of inflammation in the absorbent or lymphatic system the vessels and glands are simultaneously involved. Although there is plenty of evidence, from the examination of the dead body, that inflammation of the lymphatics may occur internally, it is only observed in the living subject in connection with the skin or an ulcerated surface, and is most common in the arm or leg, as these parts are most exposed to injury and irritation. The disease usually originates in an open wound of almost any form, as a puncture, a cut, or a blister. This wound is directly infected by some morbid matter, as, for example, the organisms present in decomposing mud or in the discharge from a septic sore. The inflammation that is thus set up in the lymphatics always extends towards the trunk, never in the opposite direction. The degree of inflammation of the gland may vary from slight enlargement, with tenderness on pressure, to profuse suppuration.

Adenoids are 'gland-like' growths (usually in children or young persons), soft, spongy tissue between the back of the nose and the throat, which impede the breathing, provoke asthma, give rise to a catarrh tending to produce deafness, induce a dull and vacant expression of countenance, and seriously hinder healthy bodily development. Like enlarged tonsils, adenoids may sometimes disappear as a child reaches adolescence; but in many cases surgical removal is the only remedy.

Adenoma means a tumour composed of tissue resembling a gland in structure. The prefix *adeno-* is used in medicine to indicate a glandular nature, as in the terms Adeno-sarcoma, Adeno-carcinoma.

Adenostoma, a Californian genus of rosaceous shrubs. *A. fasciculatum* forms the thickets called chaparral on dry grounds.

Aderbaijan, Aderbijan. See AZERBAIJAN.

Aderno (ancient *Adranum*), a town of Sicily, 17 miles NW. of Catania. It is situated at the base of Mount Etna, has an ancient Norman tower, now a prison, and several churches. Population, 30,000.

Adersbach Rocks, a remarkable labyrinthine group of sandstone rocks situated near the village of Adersbach, in the NE. of Bohemia. The aspect of some parts of the group has been compared to that of a city ruined by a conflagration. There are thousands of curious cones, peaks, and pinnacles (one over 200 feet high); many of which have names such as 'The Praying Monk,' and 'Sugarloaf.' The structure of the rocks has been produced, not by any commotion of the earth, but by the influences of rain, frost, and other atmospheric changes, wearing down the soft sandstone by very deep furrows into fantastic forms.

Adhesion, in Pathology, a vital union between two surfaces of a living body which have been either naturally or artificially separated. In the healing of Wounds (q.v.), it is usually an altogether

beneficial process; though even in this case it may cause deformity—e.g. when adjacent surfaces of two fingers are allowed to become united by adhesion after a burn. After injuries to joints, adhesion frequently takes place between the injured structures and those adjoining, which may cause subsequent stiffness. Adhesion is a frequent consequence of inflammation of serous and synovial membranes—e.g. Pleurisy (q.v.) may cause adhesion of the lung to the chest-wall; Inflammation (q.v.) of a bursa or sac may lead to its obliteration by adhesion of its opposing surfaces. In inflammation of mucous membranes it is rare.

Adhesion, in Physics. See COHESION.

Adiabe'ne, a district of Assyria, E. of the Upper Tigris, between the greater and the lesser Zab rivers.

Adiantum. See MAIDENHAIR.

Adia'phora (Gr.), things indifferent which men might or might not do without violation of the law of God. The name was specially applied during the Protestant controversy in Germany to certain customs in use in the ritual of the Roman Church, which were declared things indifferent—of which the use was an open question—by the Leipzig interim of 1548. The most important of these were episcopal jurisdiction, and the use in religious worship of pictures, candles, surplices, Latin hymns and vespers. These Melanchthon and his party were ready to accept for the sake of the harmony of the church, while more strenuous Lutherans saw in such conformity a renunciation of the faith.

Ad'igé (Ger. *Etsch;* ancient *Athĕsis*), after the Po, the most important river in Italy, rises in the Rhætian Alps, and is formed by various streamlets which descend from these mountains and unite at Glurns. From Glurns it flows east into Tyrol, then, after a slight *détour* to the south-east, it flows due south past Trent and Roveredo into Lombardy, and, passing Verona, takes a south-eastern sweep, discharging its waters into the Adriatic, not far north of the Po. It is very rapid, and subject to sudden swellings and overflowings, which cause great damage to the surrounding country. Its banks have repeatedly been the scenes of bloody engagements. Its length is about 250 miles; its breadth in the plain of Lombardy, 650 feet; its depth, from 10 to 16 feet. It is navigable as far as Trent, but the navigation is difficult, on account of the swiftness of the current. The Adige forms a joint delta with the Po. Within historic times it has changed its course considerably. Formerly it entered the Adriatic farther north than now.

Adi Granth, or GRANTH SAHIB, the sacred books of the Sikhs (q.v.).

Adipic Acid, $C_4H_8(COOH)_2$ (Lat. *adeps,* 'fat'), a member of the dicarboxylic acids, of which oxalic acid is the lowest member, is a white crystalline solid, melting at 148° C. It is obtained from fats by oxidation with nitric acid.

Adipoce're (Lat. *adeps,* 'fat,' and *cera,* 'wax'), a substance resembling a mixture of fat and wax, and resulting from the decomposition of animal bodies in moist places or under water. Human bodies have been found, on disinterment, reduced to this state. Lean beef kept under running water for three weeks was found reduced to a fatty substance. A piece of a liver that has suffered what is called fatty degeneration, if immersed for some time in water, is said to become exactly like adipocere.

Adipose Tissue consists of an aggregation of minute spherical pouches or vesicles filled with fat or oil. Under the microscope, each vesicle presents a very delicate envelope inclosing a drop of the oily matter. Thus it is that in the living body the fat, although nearly liquid, is not moved by gravitation, as is the case when the filamentous tissues are infiltrated by the water of dropsy. It is copiously supplied with capillary blood-vessels, but no nerves have been seen to end in it, and thus it may be punctured without causing pain. Adipose tissue is widely distributed throughout the body. It occurs as the yellow marrow of bones. A considerable layer is found under the skin, where it serves to give smoothness and roundness to the contour, and, being a bad conductor of heat, it is specially valuable in retaining the warmth of the bodies of animals exposed to great cold, such as whales. Being light and elastic, it forms an excellent packing substance; hence it is found surrounding large vessels and nerves, in the omentum and mesentery, round the kidneys, joints, &c., where it affords support, and protects from injurious pressure. Its utilisation as a reserve supply of nutriment is well illustrated in hybernating animals like the hedgehog.

Fat Cells (highly magnified): *m*, membranous envelope; *n*, nucleus of cell; *fg*, fat globule; *ct*, connective tissue. Blood-vessels not represented.

Adirondack Mountains, the chief range in New York State, lie between Lakes Champlain and Ontario, and extend from the NE. corner of the state towards its centre. Rising from an elevated plateau about 2000 feet above sea-level, they are remarkable for grand and picturesque scenery; the highest summit, Mount Marcy, is 5402 feet high. Small lakes are numerous; the head-streams of the Hudson are here; and there is much fine timber in the region. The discovery of magnetic iron in the township of Macomb, led to the establishment of the village of Adirondack, but the works were afterwards abandoned. The whole northern wilderness of New York State is popularly known as the Adirondacks, and is a very favourite resort of sportsmen and pleasure-seekers.

Adjudication, in English law, means an order of the Bankruptcy Court, adjudging the debtor to be a bankrupt, and transferring his property to a trustee. See BANKRUPTCY. Another meaning of the term common both to English and Scottish law is the assessment by the Commissioners of Inland Revenue of the amount of stamp duty chargeable upon a document. The decision is indicated by an 'adjudication' stamp. In Scots law the word is used to denote a proceeding in court to take the heritable property of a debtor in satisfaction of debt, or to make up a title to heritable property where an agreement has been made to transfer it, and also in certain cases of intestacy.

In the United States, adjudication is used generally as the act or process of trying and determining judicially; it is the judgment of a court. Adjudication is also used specifically as the act of a court declaring a person bankrupt.

Adjustment of Average is a term used mainly in Marine Insurance, but also in Fire Insurance, to denote the ascertainment of the amount which the insured is entitled to receive under the policy, and of the proportion of the loss to be borne by each underwriter. For the principles on which this adjustment takes place, see INSURANCE (Marine and Fire). It is generally done by the brokers or the agents of the assured, or the matter may be referred to arbitration. The nature and amount of

damage being ascertained, an indorsement is made on the back of the policy, declaring the proportion of loss falling on each underwriter; and on this indorsement being signed or initialled by the latter, the loss is said to have been adjusted. Unless made under a serious mistake as to facts, this signature or initialling binds the underwriter both in a question with the insured and with the other underwriters. Adjustment of *General Average* is made as soon as the ship arrives at its destination, and in case of dispute is referred to a body of 'average adjusters.' See AVERAGE.

In the United States the adjustment, to be binding, must be intended by the parties to be absolute and final. No specific form is necessary; it may be made by indorsement on the policy, by payment of the loss, or the acceptance of an abandonment. Fraud on the part of either party will vitiate an adjustment. If one party is led into a mistake of fact by the fault of the other party, the adjustment will not bind him.

Adjutant, an officer not above the rank of major, appointed to assist the officer commanding a regiment of cavalry, a brigade of artillery, a battalion of infantry or of mounted infantry, or a depot of Royal Engineers, of infantry, or of Army Service Corps. In the field he acts as aide-de-camp, and in quarters has charge of correspondence, drill, and discipline; keeps and regulates the officers' duty roster (or list); issues orders by the commanding officer's authority; supervises the training of recruits and instructs the non-commissioned officers and newly joined officers; has charge of the orderly-room (colonel's office), and all records and returns prepared there; and is generally responsible to the commanding officer for the efficiency of the corps. An assistant-adjutant is sometimes appointed, a young officer in training for the post of adjutant. The appointment is held for three years, and may be extended. Adjutants must have a musketry-course certificate. They receive extra pay according to circumstances.—*Adjutants of Territorial Forces* are officers of the regular army appointed by the Army Council for a term of three years. The adjutant of a brigade is the Brigade-major (q.v.).—The *Adjutant-general* is the second military member of the Army Council. He deals with supply of officers and men, recruiting, pay, discipline, rewards, peace regulations, mobilisation, medical services, army schools, auxiliary forces. He is the head of an important department of the general staff, which ramifies through the larger units of the army. In those called infantry divisions and cavalry divisions there are assistant-adjutant-generals, deputy-assistant-adjutant-generals, one of each to each division. These are officers of the general staff, and all are, in their respective units, representatives of the adjutant-general, and have duties analogous to his.

In the French army an 'adjudant,' usually called *adjudant sous-officier*, corresponds in some degree to our sergeant-major. The *capitaine adjudant major* corresponds to our *adjutant*.

Adjutant (*Leptoptilus argala*), a stork-like bird, common during summer in India. It is especially frequent in the north, and extends southwards to the Malay peninsula. Generally stork-like in appearance, it stands about 5 feet high, and measures 14 or 15 feet from tip to tip of extended wings. The four-sided pointed bill is very large; the head and neck are almost bare; and a sausage-like pouch, sometimes 16 inches long, and apparently connected with respiration, hangs down from the base of the neck. While feeding largely on carcases and offal about the towns, it also fishes for living food, and sometimes devours birds and small mammals. According to popular superstition in India, the brain of the living bird contains a stone valuable as a poison antidote. The loose under-tail

Adjutant.

feathers of this and of another species (the Marabou stork) are used for decorative purposes.

Adjygurh. See AJAIGARH.

Adler, NATHAN MARCUS, chief-rabbi, was born at Hanover in 1803, and educated at Göttingen, Erlangen, and Würzburg. He became chief-rabbi of Oldenburg in 1829, of Hanover in 1830, and of the united congregations of Britain in 1845. His writings are *Sermons on the Jewish Faith*, and *Nethina Lager*, on the Targum of Onkelos. He died 21st January 1890.—HERMANN, his son, born in Hanover in 1839, graduated B.A. at London in 1859, and Ph.D. at Leipzig two years later. In 1863 he became Principal of the Jews' College in London, and in 1879, as delegate chief-rabbi, coadjutor to his father. He greatly distinguished himself by his learned and spirited defence of his co-religionists in the columns of the *Nineteenth Century* and elsewhere, especially by his vigorous controversy with Professor Goldwin Smith on the subject of the Jews as citizens. Hardly less able were his earlier reply to Colenso's criticism on the Pentateuch, and that to Max Müller, entitled *Is Judaism a Missionary Faith?* A member of the Mansion House Committee for the relief of the Jewish victims of persecution in Russia in 1881–82, Adler visited the conference of leading Jews at Berlin, and afterwards the colonies of Russian refugees in the Holy Land. Other works are *The Jews in England; Ibn Gabirol, the Poet Philosopher*, &c. He died 18th July 1911.

Ad Lib'itum (Latin, 'at pleasure;' in Italian, *a piacere*, or *a piacimento*) is a musical term which implies that the part so marked may be performed according to the taste of the principal performer, and not necessarily in strict time. Ad Libitum also frequently means that a part for a particular instrument or instruments, in instrumental scores or pianoforte arrangements, may either be played or entirely left out.

Admetus, the husband of Alcestis (q.v.).

Administration, in politics, is equivalent to the executive government of a state; in Britain, more especially the ministry.

Administration, RIGHT OF, is the right reserved by the law of Scotland to the husband of managing the wife's property. It is distinct from the *jus mariti* which before 1881 transferred the wife's movable estate to the husband. The wife

can now dispose of her income without her husband's consent, but not the capital.

Administrator, in the law of England, is the person to whom the Probate Division of the High Court commits the administration or distribution of the personal estate of a person dying intestate, or leaving a will in which no executor is named. The administrator is usually the wife or child or a creditor of the deceased, or a person who has an interest in the property. The Public Trustee may now be appointed administrator. The duties of an administrator are to pay the funeral expenses, the cost of obtaining probate of the will or 'letters of administration,' and the debts of the deceased, and thereafter to hand over the property to those entitled. In the Scottish law a father is ADMINISTRATOR-IN-LAW for his children, and, as such, is their guardian during minority.

In the United States an administrator is a person appointed by competent authority to manage and distribute the estate of an intestate. Any person competent to make contracts may be appointed. The husband of a deceased wife, or the wife of a deceased husband, the next of kin, or creditors of the decedent, may be appointed to administer upon the estate. An administrator is generally obliged to give a bond for the faithful performance of the duties therein mentioned.

Admiral, since the 13th century, the title borne by officers appointed to the command of a fleet or squadron. The word is said to be derived from the Arabic *Amīr* or *Emir*, a man in authority; thus *Amīr-al-Bahr*, commander of the sea, whence the abbreviation 'Amiral' or 'Admiral.' The first record of the use of the title in England is to be found in a convention signed at Bruges on 8th March 1297, in which Sir William Leybourne is styled 'Admiral of the Sea of the King of England.' In the 14th century we find the title conferred on the officers commanding the fleets for the protection of the coasts, and it was at this period also that the rank of Vice-admiral and Rear-admiral is first met with. In the early part of the 15th century we find mention made of an 'Admiral of England,' in the person of the Earl of Somerset, to whom extensive powers were granted; his successors in this office bore the title of 'Lord High Admiral,' who, in addition to exercising executive and administrative control, went afloat in command of the fleet when occasion required, as Lord Howard of Effingham did against the Spanish Armada and the Duke of York (afterwards James II.) against the Dutch. See ADMIRALTY and ADMIRALTY COURTS.

By the middle of the 17th century our fleets had come to be divided into three squadrons, distinguished as the Red or Centre, commanded by the admiral; the White or Van, commanded by the vice-admiral; and the Rear or Blue, commanded by the rear-admiral, each having a distinctive ensign, red, white, or blue, as the case might be. From this followed the division of officers of flag-rank into Admirals, Vice-admirals, and Rear-admirals of the Red, White, and Blue respectively, the Red taking the senior place and the Blue the junior. As, however, in the 17th and 18th centuries the admiral commanding the Centre was in command not only of the Red squadron, but of the whole fleet, he flew the Union-jack at the main as 'Admiral of the Fleet'—hence that rank; and there were no Admirals of the Red until after the battle of Trafalgar, when, as a special compliment to the navy, this rank was instituted. The flag of Admirals of the Red was plain red; of Admirals of the White, white with a red St George's Cross; of Admirals of the Blue, plain blue. The ships of different divisions of the fleet flew ensigns of the same colour as the flag of the admiral under whom they were serving. In 1863 these distinctions were done away with, the white flag with the red St George's Cross being definitely selected as the flag for admirals, with the corresponding white ensign as the ensign for H.M. ships. Admirals, vice-admirals, and rear-admirals fly their flags at the main, fore, and mizen respectively; but as battleships and large cruisers have mostly only one mast, a vice-admiral's flag is distinguished by a red ball in the inner upper canton of the flag, and that of a rear-admiral by two balls.

Flag-officers, as officers of flag-rank are termed, rise from captain to full admiral by seniority, but promotion to 'Admiral of the Fleet' is by selection with the approval of the sovereign. The establishment of flag-officers after the Great War (1919) was: admirals of the fleet, 6; admirals, 12; vice-admirals, 23; rear-admirals, 62.

In the navy of the United States no officer of higher rank than captain was commissioned prior to 1862 (with one single exception). In that year there were authorised to be commissioned 9 rear-admirals on the active list, and 9 on the retired or reserve list. Subsequently the number on the active list was reduced to 7, the number on the retired list varying from time to time. Rear-admirals have the relative rank of major-generals. The rank of vice-admiral and that of admiral were created in 1864 and 1866; both had lapsed in 1891, but in 1899 Admiral Dewey was appointed to the highest rank.

Admiralty, BOARD OF, a government department which has the management of all matters concerning the British navy. It comprises nine lords commissioners, who decide collectively on important questions. Besides this collective or corporate action, each has special duties assigned to him. There are three civil or political lords, and six naval or sea lords. The First Lord, who is always a cabinet minister, besides having a general control, is responsible for all business of the Admiralty, and the other members of the Board act as his assistants in the various duties which are divided among them. Thus the First Naval Lord is responsible to the First Lord for the administration of such business as the movements and condition of the fleet operations and general naval policy, and is chief of the naval staff. He also advises as to appointments of flag-officers and certain officers in command of ships. The Second Naval Lord assists the First Naval Lord, and is responsible for all matters in connection with *personnel*. The Fourth Naval Lord assists the First Naval Lord, and appoints officers of civil branches, looks after fuelling, victualling, and legal matters, &c., connected with the fleet. The Controller of the Navy is responsible to the First Lord for business relating to the *matériel* of the fleet—that is, the building and repairing of ships—and to guns and naval stores. The Civil Lord acts as assistant to the Parliamentary Secretary. Under the lords are the First Secretary (parliamentary), the Second Secretary (permanent), and the Naval Secretary (professional). The Parliamentary and Financial Secretary is responsible to the First Lord for the finance of the department and parliamentary duties. The Permanent Secretary has exclusive charge of the secretariate, under direction of the First Lord, and is responsible for the discipline and general organisation of admiralty office. The post of private secretary to the First Lord is an appointment usually held by a post-captain of the Royal Navy. The only lord who necessarily resigns when the prime minister resigns is the First Lord, yet a change of the others frequently takes place. The other two naval lords are called Deputy Chief of Staff and Assistant Chief of Staff—the former advises on war operations in home waters; the latter advises on war operations abroad and on anti-submarine matters. There is also a liaison officer of high rank to advise as to matters in connection with the Royal

Air Force. All delicate or doubtful matters are specially reserved for the First Lord; but in the Board meetings he has only one vote, like the rest, though, from his general parliamentary responsibility, he practically has both an absolute veto and an absolute power of giving action to his views.

Admiralty Courts. The Admiralty Court (whose functions are now exercised by the Probate, Divorce and Admiralty Division of the High Court of Justice, constituted in 1873–5) was created to try and decide maritime causes. Formerly, the maritime courts of England were divided into the *Instance Court* and the *Prize Court*—separate tribunals, though usually presided over by the same judge; the Prize Court (q.v.) exists only during time of war. The jurisdiction in question of booty of war, and the distribution thereof, was in 1865 conferred on the Admiralty Court; and jurisdiction relating to the attack and capture of pirates is vested in the court in this country, and in the vice-admiralty courts in the colonies and foreign possessions. The proceedings of the Admiralty Court, like those in the ecclesiastical courts, were originally based on the civil law, and upon this account it was usually held at Doctors' Commons. But it is merely as the basis of the earlier mercantile codes, such as the Rhodian laws and those of Oleron, and by no means exclusively, that the civil law is of authority in these courts. Questions of the utmost nicety in the law of nations fall to be decided by maritime courts in time of war. The appeal from the Admiralty Court, which was originally to the king in Chancery, is now to the Court of Appeal created by the Judicature Act of 1873–5. Appeals from the vice-admiralty courts in British colonies and dependencies formerly lay to the Admiralty Court in England, but are now carried to the Court of Appeal. The civil jurisdiction of the Admiralty Courts now extends generally (and the county courts also exercise part of it) to disputes between part-owners of a ship, suits for mariners' and officers' wages, suits for pilotage, suits on bottomry and respondentia bonds, and relating to salvage, wreck, collision of ships, &c. County courts are expressly prohibited from entertaining questions of prize, questions arising under the act for the suppression of the slave-trade, or questions of Admiralty jurisdiction by way of appeal. In criminal matters, the Admiralty Court formerly took cognisance of piracy and other offences on the sea, or on the coasts beyond the limits of any county, and, concurrently with the common law courts, of certain felonies committed in the main stream of great rivers below the bridges. This criminal jurisdiction is regulated now by the Criminal Law Consolidation Acts generally; and the criminal jurisdiction of the Admiralty Court may be regarded as obsolete. There is a separate Court of Admiralty in Ireland. The Admiralty Court of Scotland has been abolished, and its ordinary jurisdiction transferred to the Court of Session, the Court of Justiciary, and the sheriffs; questions of prizes, captures, condemnations, and the like, being vested exclusively in the Admiralty Division of the High Court in England.

In the United States, the court of original Admiralty jurisdiction is the United States district court. From this court causes may be removed, in certain cases to the circuit, and ultimately to the supreme court. The jurisdiction of Admiralty has been extended beyond that of the English Admiralty Court. Its *civil* jurisdiction extends to cases of salvage, bonds of bottomry, respondentia, seamen's wages, seizures under the law of imposts, navigation or trade, cases of prize or ransom, charter-parties, contracts of affreightment between different states or foreign ports, contracts for conveyance of passengers, contracts with material men, jettisons, maritime contributions and averages, pilotage, surveys of ship and cargo, and generally to all damages and trespasses occurring on the high seas. Its *criminal* jurisdiction extends to all crimes and offences committed on the high seas, or beyond the jurisdiction of any country. Courts of Admiralty, within the limits of their jurisdiction, resemble courts of equity in their practice and modes of proceeding, but are even more free from technical rules.

Admiralty Droits were formerly a portion of the hereditary revenues of the crown, arising from enemies' ships detained in the prospect of a declaration of war, or coming into port in ignorance of the commencement of hostilities, or from such ships as are taken by non-commissioned captors, the proceeds of wrecks, the goods of pirates, and the like. The proceeds of the Droits of Admiralty are now paid into the Exchequer for the public use.

Admiralty Island lies off the coast of Southern Alaska, in 57° 30′ N. lat., and 134° 15′ W. long. It is about 90 miles long, well wooded and watered; and contains coal and copper. It is inhabited, and belongs to the United States.

Admiralty Islands, a group of 40 islands, to the NE. of New Guinea, about 2° S. lat., and 147° E. long. They were discovered by the Dutch in 1616. The largest is above 50 miles long, and is mountainous but fruitful; their total area is 878 sq. m. Some are volcanic, others are coral islands. They abound in coconut-trees, and are inhabited by a race of tawny frizzle-headed savages, of the Papuan stock, about 800 in number. Together with New Britain and some adjoining groups, they were annexed by Germany in 1885, and are now included in the Australian mandate for New Guinea.

Adobe (Span. *adobar*, 'to plaster') is a sun-dried brick. These unburnt bricks are commonly used in Mexico, Texas, and Central America; and the houses built with them are very durable.

Adolphus, JOHN, born in London in 1768, was called to the bar in 1807, and became a successful Old Bailey practitioner. He died 16th July 1845. His historical and other works fill upwards of 20 volumes, the chief being a *History of the Reign of George III.* (1802; new ed. 1840–43).

Adonai, a Hebrew name for the Supreme Being; a plural form of *Adon*, 'lord' (see also ADONIS; and compare the art. JEHOVAH), combined with the pronoun of the first person. In reading the Scriptures aloud, the Jews pronounce 'Adonai' wherever the holy name JHVH is found in the text; and the name 'Jehovah' has arisen out of the consonants of *Jhvh*, with the vowel points of *Adonai*.

Adoni, a town of the province of Madras, 64 miles NE. of Bellary. Pop. (1891) 26,243; (1921) 30,232, many of them engaged in weaving.

Adonis, in Greek Mythology, a youth of marvellous beauty, beloved by Aphrodite. He was killed by a boar while hunting, and the goddess, coming too late to his rescue, changed his blood into flowers.—A yearly festival was celebrated in honour of Adonis, and consisted of two parts—a mourning for his departure to the under world, and a rejoicing for his return to Aphrodite. This festival, widely spread among the countries bordering on the Mediterranean, was celebrated with peculiar pomp at Byblus and Alexandria. Before the festival, wheat, fennel, and lettuce were sown in earthen and even in silver pots, and forced by heat; intended to indicate, doubtless, by their brief bloom, the transitoriness of earthly joy. The myths connected with Adonis belong originally to the East. They display a worship of the powers of nature conjoined with that of the heavenly bodies, and Adonis himself

appears to be the god of the solar year. The similarity of the name to the Phœnician *Adon*, which signified 'lord,' is unmistakable; and this name Adon was given to the king of heaven, the sun. See J. G. Frazer's *Attis, Adonis, Osiris* (1914).

Adonis, a herbaceous annual or perennial genus of Ranunculaceæ, of which only one, *Adonis autumnalis* (Pheasant's Eye), is a doubtful native of Britain. Its bright scarlet petals obtained for it the name of *Flos Adonis*, their colour having been ascribed to their being stained with the blood of Adonis. It is a well-known ornament of our gardens; in which also *Adonis æstivalis* frequently appears, and *Adonis vernalis*, a perennial species common upon the lower hills of Middle and Southern Germany, with early and beautiful flowers.

Adoptianism, a heretical doctrine akin to Nestorianism, originated about the end of the 8th century in Spain. Elipandus, Archbishop of Toledo, and Felix, the Bishop of Urgel, advanced the opinion that Christ, in respect of his divine nature, was doubtless the Son of God; but that as to his human nature, he was only declared and adopted to be the first-born Son of God. The flame of controversy thus kindled, spread into the Frankish empire, and gave occasion to three synods, one held at Ratisbon (792), another at Frankfort (794), and a third at Aix-la-Chapelle (799). Adoptianism was condemned as heresy, and the Catholic doctrine of the unity of the two natures of Christ in one divine person was re-affirmed.

Adoption was a legal institution of much importance in both of the classical nations of antiquity, whose laws frequently encouraged the possession of a large family. Adoption, in the stricter sense, in the Roman law, applied only to the case in which a person in the power of his father or grandfather was transferred to that of the person adopting him. Where the person adopted was already emancipated from the paternal power (*patria potestas*), and was regarded by the law as his own master (*sui juris*), the proceeding was called adrogation (*adrogatio*). At Athens, the adopted child was transferred from his own family and parish or tribe (*dēmos*), into those of the adoptive father, whose property he inherited in the absence of legitimate children, and whose sacred rights he was bound to maintain. In fact, the theory of adoption at Athens, as in India, was that there might be some one to offer the funeral cake, and prevent a failure of the funeral ceremonies. Only Athenian citizens could be adopted, so that not only the next of kin, but the whole community were interested in preventing fraudulent adoptions. With this view, registration in the demos of the adoptive father was requisite, in order to entitle the son to the rights of citizenship as a member of it.

In Rome, the adopted child assumed the name, and became bound to discharge the religious duties, of the adoptive father, which usually consisted in sacrifices to the *penates* or other divinities. Adoption of a person who was *in potestate* was effected first by the form of a fictitious sale, and then under the authority of a magistrate, the prætor at Rome, or the governor (*præses*) in the provinces. Adrogation of a person who was *sui juris* originally required a vote of the people in the *Comitia Curiata;* but under the emperors it became the practice to effect it by an imperial rescript. This change of form made possible the adrogation of women. The entire property of the person adrogated passed to the *adrogator.* If a father, having children in his power, was adrogated, both he and his children passed into the power of the adrogator. Down to the time of Justinian the person adopted came under the *patria potestas* of the adoptive father. The tie of agnatio with his former family ceased, and he became agnate to the members of the adoptive family. Under the legislation of Justinian adoption (except in special cases) no longer produced these effects. Adoption was unknown to the early law of the Teutonic nations; but in the 15th century it became a prominent feature in the codes and social life of Prussia and Austria, and other German states. There, and also in France, the ceremony was carried through in open court, and conferred indefeasible rights of succession. It is, however, in the Hindu law that adoption is chiefly, in modern times, an active institution. Adoption never existed as an institution in England (till 1927) or in Scotland. The express adoption of a child—e.g. as the result of the advertisement which frequently appears—imposed no legal liability except under a contract with the true parent.

In the United States, adoption is regulated by the statutes of the several states. Generally, it is accomplished by mutual obligations, assumed in some form prescribed by law, binding upon the adopter to treat the one adopted as his own child, towards whom he will discharge all the duties of a parent; while the one adopted assumes all the obligations of a child towards a parent. But these laws differ in the several states, although they all aim at one result—viz. the creation of new civil relations of child and parent.

Adour, a French river, rising in the department of Hautes Pyrénées, and flowing 180 miles through Gers and Landes, till it enters the Atlantic below Bayonne. It is navigable for 80 miles.

Adowa, a town of Abyssinia, the capital of Tigré, stands 6270 feet above sea-level, and 145 miles NE. of Gondar. Adowa is the chief entrepôt of trade between the interior of Tigré and the coast. It has a great weekly market and an extensive transit trade, in which gold, ivory, and slaves are articles of importance. Pop. 4000. Near the town the Italians met with a disastrous defeat in 1896. See ABYSSINIA.

Adra, a Mediterranean seaport of Spain, in the province of Almeria, 49 miles SE. of Granada. The Phœnician Abdera (not the Thracian Abdera, q.v.) stood on a hill close by. There are lead-mines in the neighbourhood. Pop. 9000.

Adramyti (Turkish, *Edremid*), a town on the west coast of Asia Minor, opposite Mitylene, and amid rich olive-groves. Pop. 6000, much disturbed by migrations after the war of 1912–13. To the east lay the ancient *Adramyttium.*

Adrar, a region south of Morocco, extending from the coast some 600 miles into the Sahara, and containing oases. Adrar Suttuf is Spanish (see RIO DE ORO), Adrar Temur French.

Adrastus, a king of Argos, whose daughter married Polynices of Thebes, who had been exiled from his native city by his brother Eteocles. He led the expedition of the 'Seven against Thebes' to restore his son-in-law to his right, and was the only one that survived, as Amphiaraus had foretold. Ten years later he led the six sons of the heroes that had fallen to a new attack on Thebes —the war of the *Epigŏni* ('descendants'). This attack was successful, but a son of Adrastus fell, and the father died of grief.

Adrenalin, a powerful styptic obtained from the Supra-renal Capsules (q.v.).

Adria, a town of northern Italy, in the province of Rovigo, between the Po and Adige, was founded by the Etruscans, and till the 12th century it was a flourishing harbour of the Adriatic, to which it gave name; but by the silting up of this coast

of Italy, it has been gradually separated from the sea, from which it is now 14 miles distant. It still retains several interesting remains of Etruscan and Roman antiquity, with a fine cathedral. Pop. 20,000.

Adrian, a city of Michigan, U.S., situated on the Raisin River. It is well furnished with water-power, commands the trade of a large grain-growing region, has several factories, and a Methodist college founded in 1859. The population is about 12,000.

Adrian, the name of six popes (see POPE), none of them very remarkable. Adrian IV. was by birth an Englishman, the only one that ever sat upon the papal chair. His name was Nicolas Breakspear. He was a native of Langley, near St Albans, became first a lay-brother or servant in the monastery of St Rufus, near Avignon, and in 1137 was elected its abbot. His zeal for strict discipline raised a combination to defame his character, and he had to appear before Eugenius III. at Rome. Here he not only cleared himself of all charges, but acquired the esteem of the pope, who appointed him cardinal-bishop of Albano in 1146. In 1154 he was raised to the papal see. It has been asserted that he granted Ireland to Henry II. Adrian was at first on friendly terms with the Emperor Frederick I.; but his high notions of the papal supremacy, as high even as Gregory VII.'s, led to the beginning of that long contest of the popes against the house of Hohenstaufen, which ended in the destruction of the dynasty. He was about to excommunicate Frederick, when he died at Anagni, 1159. See books on him by Tarleton (1896), Mackie (1907), and Mann (1914).—For the Emperor Adrian, see HADRIAN.

Adrianople (Turkish *Edirné;* Bulgarian *Odrin*), a city of Thrace, stands on the navigable Maritza (the ancient *Hebrus*), 138 miles WNW. of Constantinople by rail. The city has upwards of 50,000 inhabitants, of whom about one-third are Turks. The splendid mosque of Selim II., the palace, and the immense bazaar of Ali Pasha may be named as its principal features. It has a silk-factory, and a considerable trade in opium, attar of roses, and wine. Founded or greatly improved by the Emperor Hadrian, Adrianople was the seat of the Ottoman sultanate from 1366 to 1453. The Russo-Turkish war was ended in 1829 by the Peace of Adrianople. After the capture of the Turkish army defending the Shipka Pass in 1878, the Russians entered unopposed. Taken after five months' siege by the Bulgarians in 1913, it was reoccupied by the Turks in the same year.

Adriatic Sea, a large arm of the Mediterranean Sea, extending 450 miles north-westward between the east coast of Italy and the west coast of the Balkan peninsula, being terminated to the south by the Strait of Otranto, 45 miles wide. In the north, it forms the Gulf of Venice, and in the north-east, the Gulf of Trieste. The west coast is comparatively low and has few inlets, and the north is marshy and edged with lagoons. On the other side, the coasts of Illyria, Croatia, Dalmatia, and Albania are steep, rocky, and barren, with many inlets, and begirt with a chain of almost innumerable small rocky islands. The total area of the sea, including islands, is calculated at 52,220 sq. m.—the area of the islands being 1290; the mean depth is 110 fathoms, the greatest depth 565 fathoms. The most considerable rivers flowing into the sea are the Adige and the Po, which are continually depositing soil on the coast, so that places once on the shore are now inland. The extreme saltness of the Adriatic is probably owing to the comparatively small quantity of fresh water poured into it by rivers. Navigation on the Adriatic is safe and pleasant in summer, but in winter the north-east gales (*bora*) are formidable, on account of the rocky and dangerous coasts on the east. Venice, Trieste, Fiume, Ancona, Bari, Brindisi are the chief ports. Tides are scarcely perceptible. The fisheries of the Adriatic are rich, and industriously worked. The sea owes its name to Adria (q.v.). See also ALBANIA, BUCENTAUR, DALMATIA, ITALY, &c.

Adu'le, or ADULIS, an ancient town of Æthiopia, on the Red Sea, or what is now Annesley Bay. It afterwards had some importance as the port of Axum. On its site is the modern village of Zulla. Here was found in the 6th century the *Monumentum Adulitanum*, a Greek inscription of the conquests of Ptolemy II. Euergetes.

Adullamites. The attempt to extend the franchise made in 1866 by the government of Earl Russell and Mr Gladstone, led many of the Whigs to secede from the Liberal leaders, and vote with the Conservatives. The designation of *Adullamites* was fastened on the new party, in consequence of Mr Bright having likened them to the political outlaws who took refuge with David in the cave of Adullam (1 Sam. xxii.).

Adulteration. The crime of food adulteration is a very old one. Pliny tells us of one article which was so extensively adulterated in his time, that even the wealthier members of the community could not obtain it in a state of purity. In England during the 11th century, drugs, as well as several different articles of food, were subjected to various processes of sophistication. In those early days, the means of detection of adulteration were, as may be imagined, neither so refined nor certain as those which we now possess, and in consequence—notwithstanding the greater punishments which were then enforced—the practice not only became very common, but it was carried out in a most unblushing fashion. In 1843 Mr Phillips, of the Inland Revenue, stated that it was supposed that there were no less than eight manufactories for the purpose of re-drying exhausted tea-leaves in London alone. People were employed to go about and buy up used tea-leaves at hotels, coffee-houses, and the like, which they did at the rate of twopence half-penny a pound. The leaves gathered in this way were then taken to the manufactories, where they were immersed in a solution of gum, and dried. If the leaves, thus manufactured so far, were intended to be sold as ordinary black tea, they were finished by being mixed with rose-pink and black-lead. But not only was exhausted tea made use of; such things as the leaves of the sycamore, horse-chestnut, and sloe were freely employed, and these not alone, but in conjunction with catechu, green vitriol, and indigo. In a notice of Accum's book on food adulteration, published in 1820, the following passage occurs: 'Devoted to disease by baker, butcher, grocer, wine-merchant, spirit-dealer, cheesemonger, pastry-cook, and confectioner, we call in the physician to our assistance. But here again the pernicious system of fraud, as it has given the blow, steps in to defeat the remedy. The unprincipled dealer in drugs and medicines exerts the most potent and diabolical ingenuity in sophisticating the most potent and necessary drugs—Peruvian bark, rhubarb, ipecacuanha, magnesia, calomel, castor-oil, spirits of hartshorn, and almost every other medical commodity in general demand, and chemical preparation used in pharmacy.'

A century of general advancement has no doubt produced a great change in the purity of our food; but the quarterly reports of the public analysts continually remind us that we have not

yet finally banished the demon of food adulteration from our midst. The excuses which have at different times been urged in extenuation of adulteration are numerous, and in some cases even plausible. Thus we are told again and again that many articles of food are prepared and sold in an adulterated form in obedience to the public taste. Preserved vegetables must, it is said, possess a bright, permanent green hue, in order to be appreciated by the public. Peas do not retain their natural colour when preserved, and therefore the manufacturers of these articles colour them with verdigris or some similar salt of copper. Sauces and preserved meats must, it is alleged, be made, for similar reasons, to assume a red tint; butter and cheese must be yellow, and bread white; while confections must needs possess all the colours of the rainbow. Again, it is asserted that some forms of adulteration, or, as it is more euphoniously put, admixture, are quite allowable, seeing that they are undoubted improvements. Thus, it is maintained that to mix chicory with coffee is not only perfectly allowable, but commendable, seeing that the compound is by many considered to be superior to the pure coffee. So with the admixture of such things as flour and turmeric with mustard. As a third form of excuse, we have it openly asserted that certain things must be mixed with others in order to insure their preservation. With such energy, indeed, was this insisted on, that the legislature was actually constrained to legalise an admixture of a certain amount of oil of vitriol with vinegar, in order that thereby there might be conferred upon the latter certain keeping powers, which apparently it was supposed it did not of itself possess. Another excuse frequently made use of is, that it is perfectly impossible to supply pure articles at the current price. Finally, we have frequently the plea advanced that, after all, in many cases it does no harm—as in the addition of water to milk or whisky, or potato-starch to cocoa; therefore thus diluting these substances cannot be regarded as a criminal act.

These excuses are found to be all perfectly invalid. It is possible that one who was unacquainted with the subject, might prefer such things as bright green peas or pickles to those which were more of a yellow tint. If, however, he were informed—as he certainly should be—that the bright, fresh-looking article owed its taking appearance to the presence in it of a poisonous copper salt, it is impossible to suppose that he would still elect to be supplied with it. As to admixtures being improvements, this is of course largely a matter of opinion, but it is worthy of consideration in this connection that the articles which are added by way of improvement are always very much cheaper than the articles which are supposed to have been improved. Thus coffee used to cost about two shillings per pound, while chicory cost about fourpence. Mustard cost also about two shillings per pound at a time when flour, by the agency of which the mustard is improved, cost about one penny. With reference to the statement that admixture is necessary for the preservation of certain articles, if this is true at all, it is true of very few articles indeed. That it does not apply to vinegar is abundantly proved by the fact that the vinegar now made by most if not all of the better manufacturers does not contain a drop of sulphuric acid. The statement that adulteration is rendered necessary because the public refuse to pay a fair price for pure articles, is manifestly absurd, for it is the traders and not the public who fix the price; and if a trader were only mindful to inform his patrons that, while the purity of the less costly articles sold by himself and his brethren in trade could by no means be guaranteed, that of those which were a little higher in price was undoubted, he would not have reason long to complain of a want of demand for unadulterated wares. As to such an adulteration as the admixture of water with milk doing no harm, as well might it be said that selling milk by means of a measure which only holds half as much as it is represented to hold, does no harm. We are not thereby poisoned, but we are certainly defrauded as much in one case as in the other.

The objects of employing different materials in the adulteration of food may be said to be three in number. First, for the purpose of increasing the bulk or weight of the dearer article; as, for example, when water is added to milk or whisky, or when chicory is added to coffee, or flour to mustard, or butcher fat to butter. Second, to brighten its colour, or to alter or improve its appearance; as in the case of the addition of certain metallic compounds to preserved fruits or vegetables, or the addition of barley-meal to oatmeal, or of alum to bread. Third, to increase its pungency or alter its flavour; as, for example, when pepper is added to ginger, artificial flavourings to wine or to alcohol, as is done in the manufacture of spurious liquors, such as imitation brandy, &c.

As to the means which the public possesses of preventing the sale of adulterated food, it may be said that before this crime against society can effectually be put an end to, we must be able to do two things. First, we must be able satisfactorily to detect adulteration, however skilfully it may have been done; and second, we must be able to inflict on those proved to have been guilty of the crime such penalties as will render the practice of it unprofitable.

As the detection of the fraud and the consequent exposure often forms in itself the most salutary form of punishment, the subject of the detection of food adulteration becomes a most important one. It is effected mainly by two agencies, chemical analysis and microscopical examination. They are employed for this purpose by a body of well-educated, highly trained men, known as public analysts, one of whom is to be found in almost every town of any importance. The duties of these officials, as well as the mode in which they are appointed, will be described in the article ANALYST. Public analysts have not as yet been very long in existence, but the amount of work which they have already done in the way of checking adulteration of food is very great.

It was not until the year 1860 that any general act of parliament dealing with food adulteration was passed into law in Great Britain. Previous to that date, special statutes applying to certain specified articles, such as tea, coffee, bread, and wine, were in force; but the main object of these enactments was to prevent the defrauding of the revenue, the health and protection of the purchaser being apparently a matter of secondary importance. The Act of 1860 did not seem to produce much result, although it remained in force for twelve years. In 1872 another act was passed, which, however, as it was supposed to have been the means of inflicting many real hardships on retail dealers, was superseded by the 'Sale of Food and Drugs Acts' of 1875 and 1879. It is these acts which constitute the existing law on the subject of food adulteration. They are, no doubt, in many respects better than the previous acts, but they are still far from being perfect. One of their most glaring and palpable defects is, that though they lay down with commendable minuteness of detail the mode of proving adulteration, together with the penalties to be inflicted when adulteration is proved, they do not, except in the case of one or two descriptions of spirituous liquors, say what adulteration is. It is

really therefore left to the analyst to define (except in a certain general sense) what constitutes adulteration. Analysts, it so happens, are not all at one on this point, so that it is not by any means an impossible circumstance that a substance which might be found to be adulterated, and for the sale of which a man might be fined or imprisoned in one county, would be decided in the adjacent county to be quite pure. What is obviously required in order that the act may be more workable and useful, is that adulteration should be defined in exact and precise terms. The act should set forth exactly what is to be considered as constituting adulteration in each separate article of food, so that when an analysis is obtained, there will be no doubt as to whether the article is pure.

The Sale of Food and Drugs Act, 1899, is an amending act dealing principally with dairy produce. It simplifies previous acts, and generally prohibits the importation or sale of any adulterated or impoverished article of 'food' (which has a new and very wide interpretation) unless in a tin or case with a true description of the contents. It also provides for imported dairy produce being sampled at the port of entry, so that, when necessary, action may be taken against the adulterator through the importer, instead of against the retailer. Stringent changes are made with regard to milk, butter, and margarine (see subsections *Milk*, *Butter*). Penalties for offences under the acts are increased, and additional stringency introduced into their application. The penalty for a first offence is £20; second, £50; third and subsequent, £100, and three months' imprisonment may be added if culpable personal default is proved. The following list, includes the more important of the substances often sold in an impure condition.

Milk is not only a most important article of food, but is the one most frequently subjected to adulteration. That it should be so we can easily understand. To conduct the business of a milk-seller but little capital is required; the trade is therefore largely in the hands of the lower class of traders. Then again, the admixture of water with milk, or the abstraction of cream, is not only very easy to perform, but it is also, unless by chemical analysis, very difficult to detect. The two forms of sophistication just mentioned are the only ways in which milk is ever adulterated. All the sensational stories of sheep's brains and chalk being used for this purpose are purely apocryphal. But though seemingly simple, and as compared with adulteration of other substances, tolerably harmless, this practice of reducing the quality of milk is really a very serious affair. Of all forms of food, not even excepting bread, milk is the one most largely used. In London alone, very nearly one and a half millions of money used to be annually paid for milk; and of this sum—according to a government return—about one-twentieth part, or from £70,000 to £80,000, was paid for water sold as milk. Judging from official reports made by analysts in different parts of the country, the practice of adulterating milk is carried on extensively in most, if not all, the large towns in the kingdom.

The detection of adulteration in milk, unless by means of chemical analysis, is a very difficult matter. It may be done in a rough way either by taking the specific gravity of the milk, or by ascertaining how much cream it will throw up. The former operation is carried out by plunging into the milk, at a temperature of 60° F., an instrument called a Hydrometer (q.v.), which sinks in the milk to a greater or less extent, according as the specific gravity is high or low. The second operation is carried out by placing a quantity of the milk to be tested in a long narrow glass tube, closed at one end, which stands in an upright position, and is graduated into a hundred divisions. Enough milk having been poured in to occupy a hundred divisions, it is allowed to repose in the tube for at least twelve hours. Under these circumstances, the milk will throw up a certain proportion of cream, the exact amount of which can be easily read off by means of the graduated divisions. Good pure milk will throw up a sufficient amount of cream to occupy from twelve to fourteen divisions of the scale, and such milk should have a specific gravity of from 1029 to 1032. Milk from which the cream has been removed will, on the other hand, throw up much less cream than fourteen per cent.; and milk which has been adulterated by being simply mixed with water, will show a lower specific gravity than that given above. The act of 1899, already referred to, increases the penalty for selling condensed, skimmed, or separated milk, not labelled as such, to £10.

Bread.—Bread and sugar are the purest forms of food with which the public are at present supplied. The only adulteration which we now occasionally find in bread is alum, and possibly occasionally an excessive amount of common salt. The former is added for the purpose of communicating an admired white appearance to the bread, and the latter in order that it may retain an undue proportion of water. The alum, it is alleged, is often added by the miller in order that his inferior produce may yield bread having the appearance of that made from flour of a higher class. Both of these forms of adulteration are to be severely reprobated. Alum, according to many authorities, has the effect of seriously impairing the digestibility of bread; and salt added knowingly in excess of what is necessary is a fraud, whether the allegation that it causes the bread to retain water be true or not.

Alum may be detected in bread by laying a piece about two inches square upon a saucer, and then pouring upon it a small quantity of tincture of logwood, which has previously been mixed with its own bulk of carbonate of ammonia solution. If alum be present, the bread will turn blue by this treatment, whereas, if it be free from any admixture of this kind, it will become pink. Other substances besides alum which might be present in bread, have the effect of producing a blue colour with logwood, so that all we can certainly say as the result of this test is, that if a blue colour is produced, the bread is not pure, and that the impurity most probably is alum.

Other substances said to be used for adulterating bread are rice-flour, bran-flour, potatoes, borax, sulphate of copper, sulphate of zinc, chalk, and carbonate of magnesia. These, however, if they are ever employed at all, are employed to a very limited extent only; and in England in recent times, no conviction has been obtained except for admixture of alum.

Coffee is now extensively adulterated, insomuch that it is becoming a difficult matter to obtain it free from admixture. The material most commonly used for adulterating coffee is ground chicory-root. It is used for this purpose in enormous quantities, 40 or 50 per cent. being no unusual amount to find in coffee as frequently sold; and occasionally as much as 70, 80, or even 90 per cent. has been shown to be present. When coffee cost about two shillings per pound and chicory about fourpence, the temptation to sell a mixture of the two as coffee was very strong. As already mentioned, it is legal to sell the mixture if labelled as such. Chicory may be detected in coffee by allowing a few grains of the suspected article to fall into a glass of cold water. If the coffee is pure, almost all the little

particles will, after one or two minutes, remain hard, and will continue to float on the surface, communicating very little colour to the water. If, on the other hand, chicory or any similar foreign substance be present, many of the little particles will become quite soft, and they will sink to the bottom, colouring the water more or less brown.

Cocoa is largely adulterated with sugar, arrow-root, and other starchy matters, with the view of concealing the cocoa-fat and enabling the powder to mix easily with boiling water.

Butter used to be extensively adulterated, and occasionally materials were sold as butter which contained very little or no butter at all. The original article called *butterine* was a poor compound of animal fats, manipulated with salt and milk, with or without a mixture of real butter, and was too often sold as butter. Owing to the stringency of the acts dealing with food adulteration, and particularly of the act of 1899, already referred to, this is no longer possible. The substance called *margarine*, which has superseded butterine, is, owing to greatly improved manufacture, a much superior article, and is really what it professes to be—a cheap substitute for butter, and, properly prepared, not an injurious substitute. By the act of 1899 the Margarine Act of 1887 is extended to include margarine-cheese and other products, and further and very stringent precautions are taken against their being imported or sold unless properly labelled as such. As a further precaution against its being sold as butter, margarine must not have more than 10 per cent. of real butter in its composition. The only adulterations now found in butter are boric preservatives and colouring matter.

Sugar is usually sold in a state of great purity; it should not have a damp appearance; it should have a pure, sweet taste; it should dissolve completely in cold water; and it should leave only a very small residue or ash when it is burned.

Tea was formerly much more extensively adulterated than it is at present. The only form of adulteration which we encounter in these days is in the so-called faced tea. This is nothing more than black tea, possibly not of a very high class, to which a fictitious appearance has been communicated by means of such things as indigo, Prussian blue, French chalk, plumbago, and lime being made to adhere to the surface of the leaf. This certainly is not a very serious form of adulteration, and it is very rapidly decreasing. When tea is heavily faced, the facing material may be detected by removing a portion of it either by friction on a soft piece of white cloth, or by digesting the leaves for a few minutes in a small quantity of warm water.

Oatmeal is occasionally adulterated with barley-flour, added to give a whiter appearance—to make the meal from damaged or poor oats look as if made from a better quality. The addition may be ascertained by means of the microscope. The starch granules of barley are large and somewhat oval; those of oats are smaller and angular.

Rice, properly of a creamy white, is, to meet an unreasonable demand for 'dead whiteness,' coated with a blue pigment such as indigo or Prussian blue.

Whisky is generally supposed to be extensively adulterated. This, however, is a mistaken belief. It is frequently sold when it is too new and not properly matured, and it is occasionally rather freely watered by some of the smaller retailers. Any other form of adulteration is, however, extremely rare. The strength can be ascertained by means of the hydrometer.

Brandy is a preparation resulting from the distillation of wine. There can be little doubt, however, that most of the brandy made in this country is simply a mixture of spirit with various flavouring materials, including, possibly, a small quantity of genuine brandy.

Wine.—The stronger wines, before they are imported, are generally 'fortified' by the addition of a certain amount of spirit. It is also alleged that wines are frequently coloured with various colouring matters. While this may be true of some of the very low-priced wines, it seems that, on the whole, wine for which a fair price has been paid, and which has been obtained at a respectable establishment, is fairly pure. A satisfactory test of the purity and quality of wine, and of similar spirituous liquors, cannot be made without employing somewhat complicated chemical processes.

Malt Liquors.—These vary in strength very considerably, from Scotch ale containing nearly 9 per cent. of alcohol, to table-beer containing sometimes as little as 2 per cent. Now that the use of other bitter principles than that derived from hops has been legalised, only such bitter substances as are deleterious can be regarded as adulterations. Picric acid is certainly a poison, and it has been detected in beer. Picrotoxin, the poisonous principle of *Cocculus indicus*, is another objectionable bitter substance, the presence of which in beer has been at least strongly suspected. It is supposed that other bitter substances, such as those existing in wormwood, in aloes, in gentian, and in quassia, are occasionally used in the manufacture of beer. These, however, if they are employed at all, are made use of very seldom. It was alleged on one occasion that large quantities of strychnine were habitually used by English brewers in the production of their famous bitter beer. This absurd statement was conclusively shown to be utterly destitute of foundation. The addition of undue quantities of salt to beer is an offence for which several persons have been prosecuted. The object of adulterating beer with salt is not very apparent, unless it is done with the intention of creating thirst. Salicylic acid has also occasionally been found in beer. The salicylic acid is a powerful preservative agent, and it is added with the view of conferring special keeping properties upon the beer. Sulphuric acid, sulphate of iron, and alum were at one time added to beer or porter by the London publicans, for the purpose of giving the liquor a 'smack of age,' and producing a head. This offence seems now to be of rare occurrence. An extensive epidemic of a form of neuritis in many of the midland towns of England in 1900 was traced to the presence of arsenic in beer, which in its turn was traced to 'inverted' sugar used in the manufacture, improperly prepared with impure sulphuric acid, causing the formation of arsenic.

Honey.—Much of the material sold as honey is really not honey at all. It is composed largely of starch—sugar or glucose, and contains a small quantity of real honey in order to communicate a little of the true flavour. The raw material from which this spurious mixture is made, is prepared by acting on potato starch with oil of vitriol. The result is then mixed with a small proportion of real honey, and to detect the fraud requires the resources of a chemical laboratory, no simple test sufficing.

Golden Syrup, properly the uncrystallisable part of sugar, is sometimes mixed with—harmless, but cheap and flavourless—glucose or starch sugar.

Pickles are now sold in a much purer condition than formerly. At one time it was apparently thought necessary that certain varieties of pickles should always possess a bright green colour. As the vegetables themselves did not exhibit this in a degree sufficiently pronounced, the requisite tint was produced by the agency of

verdigris or of some other salt of copper. When such an adulteration as this does exist to any considerable extent, it may be detected by introducing the blade of a steel knife, which has been recently polished by means of fine sand-paper, into the vinegar in which the pickles are preserved. The presence of copper will be proclaimed by the appearance of a coating of metallic copper on the part of the knife immersed, after that has stood in contact with the liquid for a few minutes.

Mustard is at present adulterated to an enormous extent; indeed, it is only by the exercise of care that pure mustard can be obtained. Flour and the yellow dye-stuff, turmeric, are the usual adulterants; cayenne pepper, ginger, and charlock are not nearly in such common use.

Pepper is frequently mixed with sand, occasionally with linseed-meal and other vegetable substances, and sometimes with starchy matters, such as wheat-flour, rice-flour, sago, &c. The most common adulteration, the sand, may be detected by burning the suspected pepper until all the vegetable matter is consumed, and making an examination of the ash.

Vinegar.—The chief substances employed for the adulteration of vinegar are water and sulphuric acid; chillies and grains of paradise are occasionally made use of. Adulteration by water is best detected by estimating the amount of real vinegar acid which is present, by means of a properly conducted chemical analysis. A rough test may be made by means of the hydrometer; and vinegar which shows less than 1015 on the hydrometer scale must be held to be adulterated with water. Sulphuric acid and other mineral acids may be detected by adding to the suspected vinegar a few drops of methyl aniline violet. If the vinegar be pure, no colour will result; if it be mixed with sulphuric or any similar acid, a blue or green colour will be developed.

Cinnamon may be adulterated with galangale, or with guava or jungle bark, cunningly peeled, dried, and flavoured with waste water produced in distilling cinnamon, and with impure cinnamon-oil.

In the United States every separate state has food laws of its own. The American National Pure Food Law (1907) is not of extensive scope, and does not supersede them. Australia has paid great attention to securing the purity of its food-supply. The Federal Trade Descriptions Act of 1905 gives power to compel the placing of a true description of the ingredients contained in packages of food, drink, medicine, &c. imported into or exported from the Commonwealth; and in most of the states, dairies are systematically inspected and adulteration or false description of any article of food strictly prohibited; while New South Wales, Victoria, and South Australia have set up advisory committees by which food standards are prescribed.

The following is a list of some of the chief drugs and miscellaneous articles used in the arts and manufactures, and the most usual adulterants to be found in them:

Drugs.	Adulterating Substance.
Aconite	Exhausted dried root.
Animal charcoal	Wood charcoal and earthy matters.
Asafœtida	Magnesian limestone.
Bismuth subnitrate	Calcium phosphate.
Cape aloes	Ship's biscuit and turmeric.
Cascara bark	Other barks.
Castor-oil	Olive and lard oils.
Citrate of magnesia	Sodium tartrate.
Gregory's mixture	Magnesium carbonate.
Iodine	Plumbago and sulphide of antimony.
Ipecacuanha	Potato starch.
Liquorice	Sand and starch.
Myrrh	Various gums and resins.
Oil of bay rum	Oil of clove and oil of pimento.
Oil of cacao	Tallow.
Oil of lavender	Oil of spike.
Peru balsam	Rosin, benzoin, and castor-oil.
Powdered rhubarb	Starch and turmeric.
Quinine and quinine sulphate	Cinchonine sulphate, salicine, and finely picked cotton.
Salicylic acid	Acid sulphate of potash.
Sarsaparilla	Beet-root, serpentaria, podophyllum.
Scammony	Starch and chalk.
Soap	Sand, sulphate of baryta, starch, &c.
Spruce gum	Resin.
Storax	Sawdust.
Volatile oils (such as essential oil of bergamot)	Fixed oils, chloroform, alcohol, &c.

Miscellaneous.	Adulterant.
Beeswax	Mineral matters (gypsum, sulphate of baryta, and yellow ochre), starch, resinous bodies, and paraffin.
Calicoes	Size, China clay.
Cement	Sand.
Cochineal	White-lead or talc.
Colours and dyes	Cheaper colours and diluents.
Guano and other manures	Sand, oxide of iron, ochre, &c.
India-rubber	Rubber substitute, &c.
Isinglass	Gelatine.
Linen	Cotton.
Oil	Cheaper varieties.
Paper	China clay, &c.
Seeds	Inferior and cheaper seeds.
Snuff	Carbonate of soda, and moisture.
Tobacco	Nitre, glycerine, and moisture.
White-lead	Sulphate of baryta, and chalk.
Woollen cloth	Cotton fibre, shoddy.

Adultery means illicit intercourse had by a married person. In Roman and Jewish law adultery was committed only when the guilty woman was the wife of another; but in most modern systems it is adultery if either the man or the woman is married. Under the canon law, which considered marriage as indissoluble, separation was granted to either spouse for adultery. Since the Reformation, in Protestant countries adultery has been generally recognised as a ground for complete Divorce (q.v.), at the instance of either husband or wife. In Scotland this is generally referred to a statute of 1567, but it was previously announced as the common law. In England divorce could be obtained only through private statute until 1858, when the law was established which made a distinction between the sinning husband and the sinning wife. The wife's adultery was sufficient to procure the divorce for the husband; but to free the wife, the husband's adultery had (till 1923) to be shown to be complicated with incest, bigamy, gross cruelty, or two years' desertion. A decree of divorce is, in the first instance, a decree *nisi*, to be made absolute on the application of the petitioner, after the expiry of a certain period, not less than six months. In Scotland adultery or wilful desertion by either spouse will free the other. Adultery was a crime severely punishable by Jewish, Roman, and many modern systems of law, but it is doubtful how far these laws were executed. Adultery in the case of clergy leads to deprivation of office. In England and Scotland damages may be claimed by the injured husband from the paramour, and this was the case in England even before 1858, when the Divorce Court was introduced. In England, when a marriage has been dissolved by decree of divorce made absolute, it is lawful for either party to marry again, as if the prior marriage had been dissolved by death. In Scotland a statute of 1600, still in force, forbids marriage between adulterers named in the decree of divorce. See JUDICIAL SEPARATION.

In the United States, adultery is a civil injury, for which the husband of the woman can have an action of damages against her paramour. Adultery is also a crime, punishable by fine and imprisonment, with more or less severity throughout the United States.

Ad Valo'rem (Lat., 'according to value'), a phrase used in levying customs duties, when the duties on the goods are fixed, not according to weight, size, or number, but at rates proportioned to the estimated value of the goods.

Advancement is properly an English law term which is applied to the advancing of money by a parent to a child for some such purpose as setting him up in business. Settlements very often give a power to trustees to do this. In the case of intestate succession, in England as also in Scotland, such advances made by the parent in his lifetime must be brought into hotch-pot by the children before they can share in the distribution of the parent's estate.

Advance Note, an order for (generally) a month's wage given to sailors when they engage.

Advent (Lat. *adventus*, 'the coming'), a season of preparation for the festival of Christmas, as Lent for that of Easter. In the Greek Church, the Advent period comprises forty days; and similarly, in the earliest authentic notice of Advent, a canon of the Council of Mâcon (581 A.D.), fasting three times a week is enjoined from the feast of St Martin (11th November) to the Nativity. In England, this forty days' fast was observed even after Bede's death (735), though Gregory the Great (590–604) had restricted the season to the four Sundays of Advent, now observed in the Roman communion and the Church of England. It was common from an early period to speak of the coming of Christ as *fourfold:* his 'first coming in the flesh;' his coming at the hour of death to receive his faithful followers; his coming at the fall of Jerusalem; and at the day of judgment. The Gospels for the four Sundays were chosen to illustrate this fourfold view of Advent. The Advent season is intended to accord in spirit with the object celebrated. As Christians were called upon to prepare for the second personal coming of Christ, so they are exhorted, during this season, to look for a spiritual advent of Christ. The time of the year when the shortening days are hastening toward the solstice—which almost coincides with the festival of the Nativity—is thought to harmonise with the strain of sentiment proper during Advent. In opposition, possibly, to heathen festivals observed by ancient Romans and Germans, which took place at the same season, the Catholic Church ordained that the four weeks of Advent should be kept as a time of penitence; according to the words of Christ: 'Repent, for the kingdom of heaven is at hand.' During these weeks, therefore, public amusements, marriage festivities, and dancing were prohibited; fasts were enjoined, and sombre vestments were used in religious ceremonies. It was perhaps a natural thought to begin the ecclesiastical year with the days of preparation for the coming of Christ. This practice was introduced into the Western churches in the 6th century.

Adventists, a family of American religious sects, who look for the speedy second coming of Christ, and the commencement of the millennium. The earliest to bear the name were followers of William Miller (1781–1849), and expected the end of the world in October 1843, but repeatedly changed the date. Despite such mistakes, their numbers have steadily increased, and in 1917 amounted to 118,000 members, with 2700 organisations. The several sections or sects hold varying views on the subjects of the divinity of Christ and the annihilation of the wicked.—The 'Seventh-day' Adventists set no time for the coming of Christ. They observe Saturday as the Sabbath. Alcohol and tobacco are generally forbidden, and abstinence from pork, tea, and coffee is recommended by this body.

Advertising is usually effected by means of the ordinary newspapers, covers and fly-leaves of magazines, or of newspapers and publications specially devoted to the purpose. Advertisements, both printed and written, are still posted on church-doors and other places of public resort, in which case they are commonly called bills or placards. The most formal kind of advertisement, and that which is employed in the case of royal proclamations and the like, is publication in the *Gazette* (q.v.); but such a publication alone is not a sufficient notice of a dissolution of partnership to free a retiring partner from debts afterwards contracted in name of the firm to persons who have before dealt with the firm. Public notifications are frequently enjoined by statute; as, for example, under Road and Bridge Acts, the Bankrupt Statutes, &c., and in certain actions—e.g. for the distribution of a succession, or where an entailed estate is being dealt with, the court orders advertisement. It is in England a criminal offence to advertise for stolen property, promising not to make inquiries, or to repay the money advanced by pawnbrokers. Persons advertising a reward for the return of any property stolen or lost, and adding words to the effect that if returned no questions will be asked, are liable to a penalty of £50. The same applies to the printer and publisher of such advertisement. Advertisements by public carriers, railway companies, and the like, are equivalent to offers whereby the advertiser will be bound to those who send goods on the faith and in accordance with the terms of the advertisement. By advertising a *General Ship* (q.v.) for a particular voyage, the master places himself on the footing of a public carrier, and is bound to receive goods for the port to which the vessel is advertised to sail. A merchant in such circumstances can insist on his goods being received, unless the ship be full, or the entire freight engaged. The contract of affreightment is completed by the advertisement, and the shipping of the goods in conformity and with reference thereto (see CHARTER-PARTY, CARRIER).—A duty on advertisements was first enacted in 1712, and in 1853 it was wholly repealed. The Indecent Advertisements Act, 1889, renders it a punishable offence to exhibit or deliver advertisements of an indecent nature. Under the Advertising Stations (Rating) Act, 1889, ground used for advertising is rateable.

Advertisements were not unknown in ancient Greece and Rome. The ruins of Pompeii and Herculaneum afford examples, the walls in the most frequented parts being covered with notices, painted in black and red. Announcements of plays and gladiatorial shows are common; and so are those of salt-water and fresh-water baths. In still earlier times, especially amongst the Greeks, a common medium of advertisement was the public crier; another, in cases of things stolen or strayed, or of injuries inflicted upon the advertiser, was an inscription affixed to the statues of the infernal deities, invoking curses upon the offender. In medieval times, it appears that the advertising shopkeeper's chief organ was the public crier; and it was also customary for most traders to have touters at their doors. One of the very first posters 'ever printed in England was that by which Caxton announced, *circa* 1480, the sale of the "Pyes of Salisbury use," at the Red Pole, in the Almonry, Westminster.' The *pye* or *pica* was a table or directory of devotional services.

The early newspapers of the 17th century were slow to admit advertisements; and the first regular advertisers were booksellers, followed by dealers in quack medicines, and merchants. Books and pamphlets were advertised in 1647–48, and the *Mercurius Politicus* for November 22, 1660, had a quack advertisement which might have appeared at the present time. The *Public Advertiser* (1657) consisted almost wholly of advertisements, including the arrivals and departures of ships, and books to be printed. Soon other papers commenced to

insert more and more advertisements; and by the year 1682 newspaper advertising was well developed, chiefly through the medium of the *London Gazette*, the only paper that still exists of all those started about the middle of the 17th century. In 1785 was established the *Daily Universal Register*, which, in 1788, changed its name to the *Times*. Its establishment marks the beginning of the era of modern advertising.

It is well known that most newspapers and periodicals derive the bulk of their income from their advertisements; and when we remember that there are some 2300 newspapers and 1500 magazines issued in the United Kingdom, the enormous development of advertising may be imagined. When a stamp-duty was enforced on advertisements, the *Times* paid government in 1830 the sum of £70,000; calculated on its present sale and advertisements, what would the total now be? Advertising is now an art, and great ingenuity and activity are shown in catching the eye of the public; unless guarded, the finest scenery, rocks, and islands are not held sacred by the ubiquitous advertiser. Unhappily the facilities put in their way by the papers are frequently used by unscrupulous persons to puff their wares beyond their desert, and otherwise to mislead the public; and a question has been raised as to the morality of publishing advertisements without any assurance that the expectations held out correspond in any way to the value of the specifics lauded. The aid of painters, poets, and essayists is called in to make the advertisements attractive. Thomas Holloway, who began to advertise his pills and ointment in 1837, ultimately devoted £1000 a week to advertisements. Some English advertisers are said to spend £40,000 or £50,000 a year in this way. Altogether some eighty to one hundred million pounds a year are spent on advertising in Great Britain, and about six or seven times that amount in the world, or 7s. 6d. a head.

America is the classical land of advertising. A great impulse was given to it by the establishment of the New York *Sun* in 1833, the *Herald* in 1835, and the *Tribune* in 1841. At the beginning of the 20th century there were upwards of 20,000 newspapers in the United States; and the amount spent in advertising was estimated at $500,000,000 a year. The proprietors of a quack medicine offered £5000 towards the gigantic statue of Liberty in New York harbour, provided they were allowed to put an advertisement on it for a year.

See NEWSPAPERS; Grant's *Newspaper Press* (1871); Sampson's *History of Advertising* (1874); Hatton's *Journalistic London* (1882); Coe's *Red Book on Advertising* (1904); Moran's *Business of Advertising* (1905); the *Reminiscences* of Morgan Richards (1905); T. Lewis, *The Advertisements of the Spectator* (1909); Goodall, *Advertising* (1914); and Russell, *Commercial Advertising* (1919).

Advocate (Lat. *advocatus*). An advocate is generally defined 'the patron of a cause,' though it does not appear that the 'patrons' who, in the republican era of Rome, assisted their clients with advice and pleaded their causes were called by that name. Even in the time of Cicero the term *advocatus* was not applied to the patron or orator who pleaded in public, but rather, in strict accordance with the etymology of the word, to any one who in any piece of business was *called in* to assist another. Under the Empire the term was used to signify persons who made it their profession to aid in the conduct of actions (Sig. 50. 13. 1). They received fees (*honoraria*) for their services, and occupied a position analogous to that of the advocate of modern times. The occupations of a jurisconsult and a forensic orator seem to have differed pretty much as those of a consulting and a practising counsel do with us. They might be exercised separately, but were generally combined. The office of the advocate or barrister who conducted the cause in public, was, in Rome, altogether distinct from that of the procurator, or attorney, or agent, who represented the client in the litigation, and furnished the advocate with information regarding the facts of the case. The distinction between these two occupations does not everywhere prevail; and in many of the states of Germany, in Geneva, in America, and in some British colonies, as, for example, in Canada, they are united in the same person, and there is a movement in Great Britain in this direction. The common arrangement is that a firm undertakes all legal business, and one partner does forensic, another conveyancing, business. The view on one side is that a qualified practitioner should be entitled to charge for his services, and to recover payment of accounts; on the other side, that the public interest requires a bar placed by custom and honourable feeling beyond the ordinary temptations of business. In England and Ireland, advocates are called Barristers (q.v.). In England the name advocate was confined to those formerly admitted by the archbishop to practise in the Court of Arches, and who formed a separate legal college. This was changed in 1857, and barristers now practise in the ecclesiastical courts. In Scotland, as in France, the more ancient name has been retained (see ADVOCATES). The advocates who practise under that name in the town and county of Aberdeen are, however, not advocates in this sense, but solicitors. In France, the *avocat* and *avoué* correspond very nearly to the barrister and solicitor in England.

In the United States, advocate, if used in a legal sense, is almost synonymous with counsellor. But there is in America no such distinction between the counsellor and solicitor as exists in Britain between barrister or advocate and solicitor.

Advocate, LORD. The Lord Advocate for Scotland, called also the King's or Queen's Advocate, is the public prosecutor of crimes, senior counsel for the crown in civil causes, and an officer of state of very great importance in the management of Scottish affairs. He may issue warrants for arrest and imprisonment in any part of Scotland, and possesses many other discretionary and indefinite powers. Previous to the Union, the King's Advocate had a seat in the parliament of Scotland *ex officio;* and since that event, he has been almost invariably a member of parliament. He is appointed by the crown, and his tenure of office ceases with that of the administration of which he is a member. As first law-officer of the crown for Scotland, the Lord Advocate, when in parliament, was, prior to the creation of a Secretary for Scotland in 1885, expected to answer all questions relating to the business of Scotland, and to take the superintendence of legislation for that portion of the United Kingdom, and he still largely performs these duties, especially when the Secretary for Scotland is in the House of Lords. Notwithstanding his multifarious official duties, the Lord Advocate accepts ordinary practice at the bar, and, indeed, is usually the most extensively employed practitioner connected with the party in power. He is assisted in the duties of public prosecutor by the Solicitor-general, and by four advocates, called advocates-depute, appointed by himself. His salary (since 1894) is £5000. The Crown-agent, who is a Writer to the Signet (q.v.), performs in reference to crown causes pretty much the same duties that fall to a solicitor or agent in ordinary litigation. As to the relation in which the Lord Advocate stands to the public prosecutors of crimes in the inferior courts, see PROCURATOR-FISCAL.

The Lord Advocate and Solicitor-general are entitled to plead within the bar. The Lord Advocate has a title to sue, and is the proper party to be sued, in civil actions on behalf of the crown and the public departments. He has full discretionary power as to the prosecution of crimes in Scotland. When the Lord Advocate declines to prosecute, it is competent for a private party who has suffered injury to do so with his concurrence or 'concourse.' When he refuses his concurrence, the High Court of Justiciary may authorise a private party to institute criminal proceedings in the High Court by way of 'criminal letters.'

It is not certain that the King's Advocate was originally authorised to act as public prosecutor in crimes; but he certainly possessed that power in 1587, and it seems to be implied in a statute of 1579. Under the existing system all prosecutions for the public interest by way of indictment, whether before the High Court of Justiciary or before a sheriff and a jury, proceed in the name of the Lord Advocate, and he and the subordinate public prosecutors acting under his control are directly responsible for the institution, preparation, and conduct of such prosecutions. On the death of a Lord Advocate during his tenure of office, indictments may be raised in name of the Solicitor-general then in office, until another Lord Advocate is appointed. In any case of sudden or suspicious death in Scotland, the Lord Advocate is empowered, by the Fatal Accidents Inquiry Act, 1906, to direct a public inquiry into the death and its circumstances. Special statutes confer on the Lord Advocate the right and duty of intervening in the public interest in various judicial proceedings of a civil character. Thus he may intervene in actions of divorce where there is any suspicion of collusion, in the settlement by the court of any scheme for the administration of charitable or other permanent endowments, and in certain bankruptcy proceedings. So proceedings for the revocation of a patent must be in the form of an action of reduction at the instance of the Lord Advocate, or of a party having an interest with the concurrence of the Lord Advocate. The act (48 and 49 Vict. chap. 61) which instituted the office of Secretary for Scotland expressly provides (sec. 9) that none of the provisions of the act shall prejudice or interfere with any rights, powers, privileges, or duties vested in the Lord Advocate. See G. W. T. Omond, *The Lord Advocates of Scotland* (2 vols. 1883; and second series, 1914).

Advocates, Faculty of, in Scotland. The constitution of this body, like the name by which its members are known, was unquestionably derived from France. The profession seems to have existed in Scotland from a very early time; and in 1424 a statute was passed for securing the assistance of advocates to the poor. This institution has remained with little alteration to the present time (see Poor's Roll). But though existing as a profession, the advocates of Scotland did not form a faculty or society till the institution of the College of Justice (q.v.) in 1532. At first their number was limited to ten, but there is now no limit. From the improvements which have been made in the sheriff courts, and from other causes, the amount of litigation in the Court of Session has tended to diminish, and the continued accession of new members to the Faculty of Advocates is to be accounted for only by the fact that the bar is still regarded as the regular avenue to public and official life in Scotland. The Faculty was at one time a highly aristocratic institution, but now it is recruited from all classes of society. The Scottish advocates have always taken a liberal view of improvements in the law and legal institutions; and the chief reforms in these directions are due to their initiation or support. Two examinations are imposed on candidates for admission, the one in general scholarship, the other in law—the first, however, being dispensed with if the intrant is Master of Arts of a British university, or has a satisfactory degree of a foreign university. Otherwise an examination takes place before a committee of the Faculty on (1) Latin; (2) Greek, or one modern language—French, German, Italian; (3) Ethics or Metaphysics, and Logic; (4) Mathematics, or Natural Philosophy, or Chemistry; (5) History. After the expiry of a year, the qualified intrant may go in for his private examination on law. The examiners, however, cannot take him on trial if during the year he has been engaged in any trade, business, or profession. Proof of attendance on the law-classes in a Scottish university is also requisite. An intrant who has obtained the degree of LL.B. from a Scottish university is exempted from examination. An advocate is entitled to plead in every court in Scotland, civil, ecclesiastical, or criminal, superior or inferior; and also before the House of Lords. A party may manage his own cause in the Court of Session (q.v.), so far as oral pleading is concerned, but, subject to a few exceptions, every paper in the cause must be signed by an advocate. There is a widows' fund belonging to the body, which is also regulated by statute. The supreme judges of Scotland and principal sheriffs are always, and the sheriff-substitutes generally, selected from the bar. The fees on admission to the Faculty of Advocates are about £355, the great bulk of which is devoted to the purposes of the Advocates' Library (q.v.). The Faculty elect from time to time a distinguished advocate as Dean of Faculty, who claims precedence at the bar over the law-officers of Scotland.

Advocates' Library, in Edinburgh, was established by Sir George Mackenzie of Rosehaugh, Dean of the Faculty of Advocates, in 1682. In 1684 the first librarian was appointed, his salary in 1686 being fixed at 400 merks per annum. In 1700 the collection narrowly escaped destruction by fire, after which it was removed from the Parliament Close to the ground-floor of the Parliament House, which it still occupies. By the first Copyright Act (1709), the privilege of claiming a copy of every book entered at Stationers' Hall was conferred on the Advocates' Library, and is still retained by it. The number of volumes in the library in 1692 was 3140; it is now about 700,000. The MSS. number some 3000 volumes, and relate principally to the civil and ecclesiastical history of Scotland, to genealogy and heraldry, together with poetry, bibles, prayer-books, liturgies, and copies of the Latin and Greek classics. The catalogue of 1853–79 is a complete list of all printed books in the library at the end of 1871. Although the library belongs to the Faculty of Advocates, it is freely made accessible to all engaged in literary work. The management is by a keeper and staff of assistants, working under a board of curators. Among keepers have been Thomas Ruddiman, David Hume, Adam Ferguson, and Samuel Halkett. In 1922 the library was offered to the nation as the basis for a National Library of Scotland, and in 1923 a gift of £100,000 by Sir (then Mr) Alexander Grant made the acceptance of this offer possible.

Advocation, a name formerly given to the process of Appeal (q.v.) from a Sheriff Court in Scotland to the Court of Session. It was abolished as a mode of civil appeal in 1868. But, in criminal procedure, advocation to the Court of Justiciary is still a competent method of bringing the proceedings of summary criminal courts under review.

Advoca'tus Diab'oli ('the devil's advocate'), a popular, somewhat jocular, name given to the *promotor fidei*, the person appointed to state

the objections to any proposed canonisation in the Roman Catholic Church. An examination of the past life of the candidate takes place, and in this process the *advocatus diaboli* brings forward all possible objections; while, on the other side, the *advocatus Dei* ('God's advocate'), or *promotor causæ*, undertakes the defence. See BEATIFICATION, CANONISATION.

Advowson, the right of presentation to a church or ecclesiastical benefice in England. Advowsons are either *appendant* or *in gross*. Lords of manors were originally the founders, and, of course, the patrons of churches; and so long as a right of patronage continues annexed or appended to the manor, it is called an *advowson appendant*. Such rights are conveyed with the manor as incident thereto, by a grant of the manor only, without adding any other words. But where the advowson has been once separated from the manor, it is called an *advowson in gross*, or at large, and is annexed to the person of its owner, and not to his manor or lands.

Advowsons are of three kinds—(1) Collative, where the bishop is patron. When this is the case, rights of patronage are seldom grossly abused; though clergymen complain that the bishops are accustomed to appoint their own relatives and dependents, without due regard to the principle of promotion by merit. (2) Donative, where a private patron disposes of the living without presenting his nominee to the bishop. This form of patronage is generally condemned. No benefice with cure of souls is now held as a donative; but the number of donatives is small. (3) Presentative, where the patron presents to the bishop, who may refuse to institute a person whom he has good—i.e. legally sufficient—reason to regard as unfit, in point of learning, doctrine, or morals. If the patron is a Jew, he cannot present, and his right lapses to the Archbishop of Canterbury. If the patron is a Roman Catholic, his right lapses to the university of Oxford or of Cambridge, according to the county in which the living is situated.

An advowson is regarded as real estate, and may be disposed of as freely as other rights of property, subject to the rules of law relating to simoniacal contracts. An agreement to sell an advowson or next presentation while the living is vacant is simoniacal, and therefore unlawful. By an act of 1713, clergymen are forbidden to buy next presentations for themselves; but it has been held that the act does not apply to the purchase of a life estate in the advowson. The traffic in livings is conducted as a regular branch of agency business. It often happens that a clergyman, who owns the advowson of his living, offers it for sale, 'with immediate possession'—in other words, he agrees to resign as soon as the sale is complete, that the purchaser may present himself or the person for whom he has purchased the living; and bishops acquiesce in these illegal transactions, because they see that no good will be done by compelling the vendor to remain in charge of the parish. Scandal is also caused by the advertisements put forth by the 'clerical agents' who have livings for sale. By way of inducement to purchasers, they state that 'there is a good trout stream in the neighbourhood'—'there are no charities to support'—'the weekly attendance in church is very small'—'there is no house, and consequently no obligation to reside in the parish.' If the incumbent remains in possession, it is explained that he is extremely old, and in feeble health. Sometimes the living is offered at an enhanced value, because the church or the parsonage has been improved by means of a public subscription, or of a grant from Queen Anne's Bounty.

The abuses connected with the traffic in livings have led to many parliamentary debates and inquiries. In 1879 a royal commission sat to take evidence on the subject; and in 1886 the Archbishop of Canterbury introduced a reforming bill into the House of Lords. Those churchmen who favour reform have generally disclaimed hostility to private patronage as an institution. They believe that patronage, when properly exercised, tends to bring a wholesome lay influence to bear on the clergy; they prefer that patronage should be in private and not in episcopal hands; and they are opposed to popular election, which, they say, works badly in the few parishes where the minister is chosen by the ratepayers. They are also well aware that parliament is not easily persuaded to meddle with rights which have been acquired by the payment of hard cash. But they desire to confer on the parishioners the right of raising objections to an unfit presentee, and on the bishop the right of refusing institution on any ground which implies unfitness for pastoral duty. Advocates of religious equality have sometimes opposed such legislation, holding that church reformers claim powers of self-government inconsistent with the position of a state church. The Benefices Act of 1898 provides that advowsons shall not be sold by auction except along with landed estate adjacent to the benefice, and makes various other restrictions on the transfer of patronage.

Ad'ytum, the sanctuary or innermost part of an ancient temple, which none but priests could enter, and from which oracles were delivered.

Ædiles, Roman magistrates, who had the care of public buildings (*ædes*), especially the temples, and also attended to the cleansing and repairing of the streets, the preparations for funerals, public games and spectacles, the inspection of weights and measures, the regulation of markets, &c.—At first there were only two ædiles, who were chosen from the plebeians, and styled *Ædiles plebis;* afterwards two others, styled *Ædiles curules*, were chosen from the patricians (366 B.C.), and Julius Cæsar appointed a new order of *Ædiles cereales* to take charge of the public granaries.

Ædui, a powerful tribe in ancient Gaul between the rivers Liger (*Loire*) and Arar (*Saône*), who at first formed an alliance with Cæsar, but joined the rest of the Gauls under Vercingetorix. See CÆSAR.

Ægean Culture is a name given to the earlier stage of the remarkable pre-Hellenic civilisation recently revealed by excavations at Mycenæ, Tiryns, and especially in Crete, and illustrated by buildings, pottery, bronzes, and pictures. The various stages in Crete, called Early, Middle, and Late Minoan, may be dated round about 2400, 1800, and 1200 B.C., the last broken up by the invasion of the Dorians from the north about 1100 B.C. See CRETE; GREECE; Burrows, *The Discoveries in Crete* (1907); Hall's *Ægean Archæology* (1914); and the reports and works of Sir A. Evans.

Ægean Sea. See ARCHIPELAGO.

Ægeus, a king of Athens, son of Pandion, and father of Theseus (q.v.). When Theseus sailed to Crete, he promised his father to hoist white sails on his return as a signal of safety, but forgot his promise in the joy of triumph; and his father, anxiously waiting, seeing only black sails on his son's returning ship, and believing that he had perished, flung himself into the sea, from him named the Ægean.

Ægi'na, a Greek island 33 square miles in area, in the Gulf of Ægina (the ancient *Saronicus Sinus*). It is mountainous, with deep valleys and chasms. The modern town of Ægina stands on the site of the ancient town, at the NW. end of the island. There are considerable remains still

left of the ancient city, and the ruins of solidly built walls and harbour moles still attest its size and importance. The island contains about 7000 inhabitants. The most ancient name of the island was Œnone, and the Myrmidons dwelt in its valleys and caverns. For a century before the Persian war it was a prosperous state; during this period it was also the chief seat of Greek art. Its sailors covered themselves with glory at Salamis. The Athenians in 429 B.C. expelled the original inhabitants, whose language and style of art were Dorian.

ÆGINETAN SCULPTURES.—Ægina holds an important position in the history of Greek art. On an eminence in the NE. of the island stand the ruins of a temple—of Aphaia or Rhea according to Furtwängler—whence in 1811 there were excavated a series of statues which are now the most remarkable ornaments of the Glyptothek at Munich. One group represents a combat of Greeks and Trojans for the body of Achilles. The figures are true to nature, with the structure of bones, muscles, and even veins, distinctly marked; but there is no individuality, all the faces having that uniform forced smile which is characteristic of all sculpture before the time of Phidias. Probably they date from not more than fifty years before Phidias.

Ægineta, PAULUS. See PAULUS ÆGINETA.

Ægis, the shield of Zeus, which had been fashioned by Hephæstus (Vulcan). When Zeus was angry, he waved and shook the ægis, making a sound like that of a tempest, by which the nations were overawed. It was the symbol of divine protection, and became, in course of time, the exclusive attribute of Zeus and Athene.

Ægisthus, son of Thyestes, and cousin of Agamemnon. He did not accompany the Greeks to Troy, and during the absence of Agamemnon, lived in adultery with Clytæmnestra, his wife. He assisted her in murdering her husband on his return, but was himself put to death seven years later by Orestes, son of Agamemnon. This is the account given by Homer: the tragic poets make Clytæmnestra alone murder Agamemnon, her motive in Æschylus being her jealousy of Cassandra; in Sophocles and Euripides, her wrath at the death of Iphigenia. Later writers also describe Ægisthus as the son of Thyestes by unwitting incest with his daughter Pelopia.

Ægle, a genus of Rutaceæ (see AURANTIACEÆ), of which *Ægle marmelos* produces a fragrant, delicious, and wholesome Indian fruit resembling the orange, called Bael-fruit or Bhel-fruit. In an imperfectly ripened state, it is an astringent of great effect in cases of diarrhœa and dysentery. The root, bark, and leaves are of similar properties. A perfume has been prepared from the rind of the fruit, which also furnishes a yellow dye, while the seed yields a cement.

Ægospot'amoi (Gr., 'goat-rivers'), in the Thracian Chersonesus, is famous for the defeat of the Athenian fleet by the Lacedæmonians under Lysander, which put an end to the Peloponnesian war, and to the predominance of Athens in Greece, 405 B.C.

Ælfric (called *Grammaticus*, 'the Grammarian'), a voluminous old English writer about the close of the 10th century, whose history and whose personality even are alike involved in obscurity. It is known that he was a pupil of Æthelwold, most likely at the Benedictine monastery of Abingdon, and it is more than probable that he accompanied his master on his advancement to the see of Winchester. He was appointed to rule over the new monastery at Cerne, and afterwards became abbot of Ensham. He has been sometimes, as by Wright, Dean Hook, and Mr Freeman, confounded with Ælfric, the Archbishop of Canterbury from 995 to 1005; and by others, as Wharton and Thorpe, with Ælfric, the Archbishop of York from 1032 to 1051. The grammatical works ascribed to Ælfric are his Latin and English grammar and glossary, printed by Somner at Oxford in 1659, included in Professor Zupitza's *Sammlung Englischer Denkmäler* (Berlin, 1880); and his *Colloquium*, a series of dialogues containing interesting descriptions of common life, in Latin, with English interlinear translation. His most important work is his collection of *Homilies*, 80 in number, edited by Thorpe for the Ælfric Society (1844–46). They are short and vigorous, and attracted great attention at the time of the English Reformation. The 'Paschal Homily,' as well as two or three others, has been often appealed to in controversy to prove that the doctrine of the early church in England differed in some important respects from that of the later Roman Church. Among his other works are a treatise on the Old and New Testaments, and an abridgment of the Pentateuch and the Book of Job.

Ælianus, CLAUDIUS, a native of Præneste in Italy, who studied and taught rhetoric in Rome at the end of the 2d century A.D., and was styled the 'Sophist.' Two of his works remain—the *Varia Historia*, in fourteen books (containing biographical notices, anecdotes, &c.); the other, in seventeen books, *De Natura Animalium*, on curiosities of animals and animal life.

Emilian Provinces. See EMILIA.

Æmilius Paulus was the consul who fell in the battle of Cannæ in 216 B.C. His son, Lucius Æmilius Paulus (or Paullus) Macedonicus, inherited his father's valour, and enjoyed an unwonted degree of public esteem and confidence. In 168 B.C. he was elected consul for the second time, and intrusted with the war against Perseus, king of Macedon, whom he defeated in the battle of Pydna. The son of the conqueror of Macedon, adopted by Scipio, was known as SCIPIO ÆMILIANUS.

Æne'as, the hero of Virgil's *Æneid*, was, according to Homer, the son of Anchises and Aphrodite (Venus), and ranked next to Hector among the Trojan heroes. The traditions of his adventures before and after the fall of Troy are various and discordant. Virgil gives the following version: Æneas, though warned by Priam in the night when the Greeks entered Troy, to take his household gods and flee from the city, remained in the contest until Priam fell, when, taking with him his family, he escaped from the Greeks, carrying his aged father on his shoulders, but in the confusion of his hasty flight, lost his wife Creusa. His filial affection to his father earned him the name of the 'pious Æneas.' Having collected a fleet of twenty vessels, he sailed to Thrace, where he began building a city, but was terrified by an unfavourable omen, and abandoned his plan of a settlement there. A mistaken interpretation of the oracle of Delphi now led him to Crete; but from this place he was driven by a pestilence. Passing the promontory of Actium, he came to Epirus, and then continued his voyage to Italy and round Sicily to the promontory of Drepanum on the west, where his father Anchises died. A storm afterwards drove him to the coast of Africa, and landing near Carthage, he was hospitably received and entertained by Queen Dido. His marriage with Dido was prevented only by an express command of Jupiter that he must return to Italy. The hero sailed away, leaving the unhappy queen to despair and death by her own hand. During his stay in Sicily, where he celebrated the funeral of his father, the wives of his companions and seamen, weary of long voyages without certainty of finding a home,

set fire to his fleet. After building the city Acesta, he sailed for Italy, leaving behind him the women, and some of the men belonging to his fleet. On landing in Italy, he visited the Sibyl at Cumæ, and received intimations of his future destiny. Then, sailing along the Tiber, and landing on the east side of the river, he found himself in the country of Latinus, king of the Aborigines. Lavinia, the daughter of Latinus, had been destined to marry a stranger; but her mother had promised to give her in marriage to Turnus, king of the Rutuli. A war ensued, which terminated in the marriage of Æneas with Lavinia. His landing in Italy occurred seven years after the fall of Troy. Many of the episodes in the story, as his meeting with Queen Dido at Carthage, are irreconcilable even with mythical chronology. Iulus or Ascanius, son of Æneas and Creusa, was claimed as their eponymous ancestor by the Julian gens at Rome; hence constant allusions to the divine ancestress of Augustus occur in Virgil, Horace, and other poets of his time.

Æneas Silvius. See PIUS II.

Æolian Accumulations is the term often applied to formations which are due to the action of the wind, such as the sandhills or dunes of many maritime regions, and the similar hillocks which occur in desiccated areas, such as those of the Sahara, Arabia, Utah, Arizona, &c.

Æolian Harp (i.e. 'the harp of Æolus'), a simple musical instrument which produces harmonic sounds when placed in a current of wind. It is formed by stretching eight or ten catgut strings of various thickness, all tuned in unison, over a wooden shell or box, made generally in a form sloping like a desk. The sounds produced by the rising and falling wind, in passing over the strings, are of a drowsy and lulling character, so that the Æolian harp is most fitly introduced by Thomson into the *Castle of Indolence*. St Dunstan is said to have invented it; modifications were Schnell's Anemochord (1789), and Herz's Pianoéolien (1851).

Æolian Islands. See LIPARI.

Æolians, one of the principal races of the Greek people, who were originally settled in Thessaly, from which they spread and formed numerous settlements in the northern parts of Greece and in the west of Peloponnesus. In the 11th century B.C., some part of them emigrated to Asia Minor, where they founded on the NW. coast in Mysia and the adjacent isles (hence called Æolia) more than thirty cities; among them Smyrna, and Mitylene in the island of Lesbos, where the Æolic dialect of the Greek language chiefly developed itself in the forms employed in the poetry of Alcæus and Sappho. The Æolians shared the fate of the other Greek colonies in Asia Minor. First oppressed by the Lydian kings, then deprived of their independence by the Persians, they became a portion of the great empire founded by Alexander, and were ultimately absorbed in the Roman empire.

Æolipile, a hollow metallic ball from which, when heated, steam issues by orifices in two tubes, so as to turn it. It was invented by Hero of Alexandria (q.v.). See STEAM-ENGINE, STEAM-TURBINE.

Æolotropy (from Greek words for 'changeful' and 'turning') is the opposite of *isotropy*, and implies change in the electrical, optical, or other physical properties of bodies in consequence of change of position—as when the refractive property of a transparent body is not the same in all directions. The æolotropy of Iceland spar is a notable instance. A body may not, however, be equally æolotropic in all respects; it may be isotropic in one or more qualities, and æolotropic in others. See REFRACTION, POLARISATION.

Æolus, the ruler and god of the winds, who reigned over the group of islands NE. of Sicily, named from him the Æolian Islands, now the Lipari group. The dominion over the winds was intrusted to him by Zeus, and he kept them inclosed in a cave under a mountain. He must not be confounded with his ancestor of the same name, who was ruler of Thessaly and the mythical founder of the Æolic branch of the Greek race.

Æon, a Greek word properly meaning 'age' or 'eternity,' but used by the Gnostics to mean an emanation from God, which became in some degree a separate spiritual existence, and presided over spheres of the world or phases of the world's history. See GNOSTICISM.

Æpyornis (Gr., 'tall bird'), the name given to a great wingless bird, whose remains occur in Post-tertiary deposits in Madagascar. Its sub-fossil eggs are 13 to 14 inches in diameter, and have the capacity of three ostrich eggs. There appear to have been two or three species of æpyornis, one of these being as large as, or larger than, the Dinornis (q.v.).

Æqui, a warlike tribe of ancient Italy who inhabited the upper valley and hills to the SE. of the river Anio, on the eastern border of Latium. Together with the Volsci, a kindred tribe, they waged constant warfare with the young Roman republic, sometimes carrying their raids to the very gates of the city. In 446 B.C. they appeared for the last time before the city, and in 418 they were dispossessed of their great stronghold on Mount Algidus. Their last struggle with Rome began in 304, and ended with their complete subjugation.

Aerated Bread is bread not fermented with yeast, but mechanically charged with carbonic acid gas, the gas being derived usually from carbonic acid water. See BREAD.

Aerated Waters is the name applied to the large class of beverages which are rendered sparkling by dissolving in them carbonic acid under pressure. The term does not include champagne or fermented ginger-beer, or any other carbonated beverage in which the carbonic acid gas is produced by the natural process of fermentation. Carbonic acid dissolves readily in water, that liquid absorbing at the ordinary atmospheric pressure and temperature about its own volume of the gas. Under pressure, however, as when the gas is forced into a strong vessel containing the water, it absorbs many times its own volume; and when the pressure is released, the extra amount of carbonic acid escapes, rendering it sparkling or effervescent. The water does not, however, give off all the extra gas at once; hence the well-known experiment of dropping a piece of cork into a tumblerful of lemonade, when immediate effervescence takes place, and carbonic acid is given off. All agitation, or the presence of particles of dust, favours the disengagement of the gas, and so it is that in drawing lemonade from a *siphon* (see below), the tumbler is filled with froth to an extent not noticed in pouring from a bottle. In this case, the rapidity of discharge through a narrow tube causes immediate liberation of a large volume of the gas, producing the froth referred to. The varying solubility of carbonic acid at different temperatures and pressures explains why siphons or bottles which have been kept in a cold place appear to be deficient in gas, when in reality the gas is only kept in solution by the low temperature of the water.

It would be beyond the scope of this article to describe the various forms of apparatus used in the production on the large scale of aerated water. Essentially the process consists in dissolving carbonic acid gas in water under pressure, and bottling the liquid under pressure. The carbonic acid gas is either obtained by the combustion of

coke, or by the action of sulphuric acid on chalk. In the former case the gas is supplied in a liquefied state, and is contained in steel cylinders capable of standing high pressure. In either case the gas, after being purified by washing with water, is stored in a copper bell or gasometer. Thence it is pumped along with water into copper or gun-metal vessels lined with pure tin, being made to dissolve in the water either by agitation or by other appliances. When the pressure inside these vessels reaches about 100 lb. per square inch, the water contains almost seven times its volume of gas, and is ready to be filled into bottles. The *bottling* is accomplished with great speed, an expert bottler being able to fill from thirty to fifty dozen of corked bottles per hour; while, when patent (ball-stoppered, screw-stoppered, &c.) bottles are used, from forty to seventy dozen may be filled. At first only corks were used for closing the bottles; but numerous patent bottles have been introduced, many of which depend on the internal pressure of the gas forcing a ball of glass, wood, or other material against a rubber ring placed in the neck, and thus sealing the bottle. The *siphon* is a glass bottle, fitted with a metal top, and furnished with a lever or handle, which enables a portion of the contents to be drawn off without difficulty. The head should be of the purest tin, to avoid contamination of the aerated water. Formerly there was risk of lead-poisoning by aerated waters, as they readily dissolve lead, but all manufacturers of any repute now make it a point to use no lead-piping whatever in their machinery, pure tin-pipe being alone admissible.

The better known kinds of aerated waters are: (1) *Potash and Soda waters*, which, when of full medicinal strength, contain fifteen grains of the bicarbonate of potash or soda in each bottle; usually, however, much less is put in, and the amount ranges from one to seven or ten grains; (2) *Aerated water*, which is frequently sold for soda-water, but is a simple solution of carbonic acid, and contains no admixture; (3) *Seltzer water* (better *Selters* water, being named from Selters, in Nassau, where natural mineral water of this composition is obtained), which contains the chlorides of sodium, calcium, and magnesium, along with phosphate and sulphate of sodium; (4) Medicinal waters, containing varying proportions of chemicals, as, for instance, lime, carbonate of iron, citrate of lithia, or bromide of potassium.

The temperance drinks, which include such favourites as lemonade, ginger-beer, ginger-ale, and some others, are all made by putting the requisite quantity of flavouring syrup into a bottle, and filling up with simple aerated water; and the varying qualities in the market correspond to the variety in the receipts from which they are made.

On the small scale, and for family use, carbonic acid water may be conveniently prepared in the apparatus known as the *gazogène* or *seltzogène*. It usually consists of two globes, one above the other, and connected by a tube. Powders of bicarbonate of soda and tartaric acid are then placed in the upper globe, and the apparatus is inclined till water from the lower globe enters by the tube, and fills the upper globe about one-third. The tartaric acid and bicarbonate of soda have no action on each other so long as they are dry; but whenever water is admitted, the tartaric acid combines with the soda and water to form tartrate of soda and water, and at the same time carbonic acid is given off, and descending the tube into the lower globe, dissolves in the water contained therein. A convenient arrangement also is that in which a small steel bulb containing liquefied carbonic acid is made to discharge its contents into a siphon containing plain or medicated water.

Many waters naturally aerated have important medicinal properties; see MINERAL WATERS, and Kirkby on *Artificial Mineral Waters* (1902). See also SEIDLITZ POWDERS.

Aerodrome, a name proposed by Langley, now superseded by AEROPLANE (Monoplane or Biplane, as the case may be). The word is now applied to a station or exercising-ground for aircraft, with hangars, workshops, &c. See BALLOONS AND AEROPLANES.

Aerodynamics is that branch of Hydrodynamics (q.v.) which treats of air and other gases in motion.

Aeroklinoscope is the name of an instrument invented by Buys-Ballot, and used in connection with weather-signals for exhibiting publicly the difference of barometric pressure at different observing stations. One form is a pole 30 feet high, turning on a pivot, and having on the top a horizontal arm capable of being inclined more or less. The system of working the arm is settled by agreement. See SIGNALLING.

Aerolites (Gr. *aër*, 'air,' and *lithos*, 'stone'), a name given to stony or metallic bodies falling on the earth's surface from interplanetary space. See METEORS.

Aeronautics. See BALLOONS AND AEROPLANES.

Aerostatic Press. This is a machine used in extracting the colouring-matter from dye-woods and such like. A vessel is divided by a horizontal partition pierced with small holes. Upon this the substance containing the colour is laid, and a cover, also perforated, is placed upon it. The extracting liquid is then poured on the top, and the air being drawn from the under part of the vessel by a pump, the liquid is forced through the substance by the pressure of the atmosphere.

Aerostatics is that branch of Hydrostatics (q.v.) which treats of the equilibrium and pressure, &c. of air and gases.

Æs'chines, an Athenian orator, second only to Demosthenes, born 389 B.C. In the question of the attitude of Athens towards King Philip of Macedon, who was then pursuing his designs for the subjugation of the several Greek states, Demosthenes advocated the policy of opposing him before it was too late, while Æschines was the head of the peace-party. He was a member of more than one embassy sent by the Athenians to Philip; and Demosthenes accused him of receiving bribes from the Macedonian monarch, and of betraying the cause of Athens and of her allies. There is no proof that this was the case; and perhaps Æschines was deceived by the wily Philip into believing that no harm was meant to the liberties of Athens, and that peace was the best policy for his countrymen. The result justified the sagacious fears of Demosthenes, and condemned the selfish, isolating policy of Æschines. When it was proposed to reward Demosthenes with a golden crown for his patriotic exertions in defence of his country, Æschines indicted the proposer, Ctesiphon, for bringing forward an illegal proposition. Demosthenes replied in perhaps the greatest of his speeches, and Æschines being vanquished, and having thus incurred the penalty attached to an unfounded accusation, was obliged to retire from Athens. He finally established a school of eloquence in Rhodes, which enjoyed a high reputation. The story is told that once he read his great oration against Ctesiphon at Rhodes, and when some of his hearers expressed their wonder at its want of success, he replied, 'You would cease to be astonished if you had heard Demosthenes.' He died at Samos, 314 B.C. The oration against

Ctesiphon and two others are the only authentic productions of Æschines that have come down to us. They are found in editions of the Attic orators, as those of Bekker. Good editions of the three speeches alone are those by Franke (Leip. 1860) and Weidner (Berl. 1872). See Jebb's *Attic Orators* (2 vols. 1876–80).

Æs'chylus, the son of Euphorion, to us the father of Greek tragedy, was born at Eleusis, the town of the Mysteries, near Athens, in 525 B.C., and no doubt had his religious feeling stimulated by the solemn services which represented the deepest and purest elements of Greek religion. We know that he was initiated, by the fact that he was accused of divulging the divine secrets in one of his plays. The first attempts at tragedy had been made by Thespis, who is to us only a name; and there were older contemporaries of Æschylus, with whom he contended successfully, but who no doubt helped to perfect his education in poetry. He fought for Athens in the great Persian wars, and is reported to have been wounded at Marathon, where his brother fell. Pausanias tells us that in his epitaph he recalled these facts of his life, rather than his victories as a poet. The first of these latter was gained in 485 B.C., and from this time till the middle of the century he worked with all the energy and patience of a great genius at his art. He won thirteen first prizes in tragic competitions, and was exceedingly hurt at being defeated by Sophocles in 468 B.C. This may have induced him to leave Athens and go to Sicily, which he had already visited to bring out a play for the artistic tyrant Hiero. He produced there a new edition of his extant *Persæ*. His trial before the Areopagus on the charge of divulging the Mysteries is, however, also stated as a cause of his departure. His last great victory was won in 458 B.C., with the trilogy which we still possess, and three years later he died at Gela in Sicily, where his tomb was shown long after. The Athenians specially rewarded any impresario in after-days who brought out his plays afresh. There are a few fables current in addition to the above meagre facts, but they are not worth repeating here. Out of some sixty plays ascribed to him, we have only seven extant, on each of which we shall say a word.

The *Suppliants* is the earliest, at least in form (its date uncertain), for the chorus is still the principal feature, as we know it had been in the first attempts of Thespis. The plot, which is exceedingly simple, is based on the escape of the fifty daughters of Danaus from their suitors, the sons of Ægyptus, and their *supplications* to the king of Argos to protect them. There is very little character-drawing, save that of nationalities, the petulant and insolent Egyptians being contrasted with the honourable and somewhat democratic people of Argos, whither the suppliants have fled. Yet this simple subject gives the poet occasion for the loftiest utterances on Fate and Divine Providence, expressed in that tremendous diction which no other Greek poet ever equalled.

The *Persæ* is profoundly interesting, as giving us, in a tragedy, a piece of contemporary history, for the poet fought in the battle of Salamis, which he describes. But far from degrading his play into a mere panegyric of Athenian valour, the poet lays his scene far away at the Persian court, where the queen-mother Atossa is awaiting news of Xerxes' army. The ghost of Darius which appears is perhaps the most distinctive character.

The *Seven against Thebes* brings us to a more advanced stage of the poet's development. It is no longer the chorus but Eteocles, the patriotic king of the Cadmeans, who takes the leading part. The drawing of his character is clear and sharp, and Mr Verrall, in his edition of this play (1887), has also shown with what delicate artifice the poet has brought his hero, by the insensible steps of a hideous fate, to meet his brother Polynices in fratricidal conflict. Both the narrative of the messenger who gives the details of the fight, and the choruses uttered by terrified maidens of the city, are full of life and beauty. The bringing in of the bodies, and the lament over them, form a sort of musical conclusion to the play.

The *Prometheus Bound* is the perfection of Æschylus' art, and shows us what his genius could do in *simple* tragedy, in the old plotless, motionless, surpriseless drama, made up of speeches and songs and nothing more. We now have three actors together on the stage, and the duties of the chorus, once so prominent, are becoming restricted to subordinate work. Prometheus, the heroic sufferer, sustains the whole interest of the play. He is driven with insult to the Caucasus. He soliloquises. He discourses with friendly nymphs and their cautious father, Oceanus. He condoles with the frantic Io, who passes by in her wanderings: he prophesies her future. Lastly, he bids defiance to Zeus, through his messenger Hermes, sent to coerce him into further prophecy, and disappears amid thunder and whirlwind. Almost every commentator has imagined that Æschylus had some deep theory in his mind, which he desired to illustrate by the play. But whether that theory was philosophical, or moral, or scientific, or political—whether he meant to symbolise the struggles of man against nature, or against passion, or against tyranny, or against theology—will never be determined.

We now come to the *Oresteia*, or three plays on the fortunes of Orestes, which is the latest and greatest work we have from Æschylus. These pieces, the *Agamemnon*, *Choephori*, and *Eumenides*, are the only extant specimens of what the Greeks called a trilogy, and show us how the older tragic poets combined three plays on a single subject.

The first of the series, the *Agamemnon*, is the longest play left us by the poet, as perhaps the greatest Greek play of all that have survived. With a perfectly simple plot, there is splendid and consistent drawing of character, deep philosophy in the choral songs, and a certain gloomy grandeur which makes it unique. The central point of interest to the reader is the scene between Cassandra and the chorus, when she tries to make plain to them the horrid murder of the king, which she foresees as imminent. Agamemnon is drawn as in the *Iliad*, a great king but a weak man, while Clytæmnestra is the leading spirit of the piece. Even in the collateral quality of picturesqueness, this masterpiece is above almost all its rivals.

The *Choephori*, a shorter and less striking play, but not without the same grandeur and the same gloom, gives us the return of Orestes from exile, and his murder of Clytæmnestra, in accordance with both the command of the oracle and the sentiments of the Greek mind.

In the *Eumenides*, we find the necessary results of the previous tragedy. Though Orestes has obeyed one great moral law, avenging the blood of his father, he has violated another no less sacred in taking the life of his mother, whose Furies (Eumenides) persecute him with ceaseless pursuit.

There are a large number of short fragments preserved in quotations, but none of sufficient importance to detain us here. The genius of Æschylus is quite peculiar in Greek literature, and he has no equal. There is something oriental in his boldness, his uncouth yet expressive compounds, his daring, piled-up metaphors. But what distinguishes him still more from great contemporaries like Pindar, or great successors like Sophocles, is the grandeur of his

conceptions in theology, in the providential ruling of the world, the inheritance of sin, the conflict of rude with purer religion.

There are texts by Wecklein (1885-93), Paley (4th ed. 1879), Sidgwick (1900), Wilamowitz-Möllendorf (1914); single plays by Sidgwick, Verrall, Prickard, Tucker, Weil, Mills, and others; translations in prose by Paley (1871) and Headlam (1904–10), and in verse by Potter, Blackie, Plumptre, Miss Swanwick, Lewis Campbell, Way (1906-9), and of one or more plays by R. Browning, FitzGerald, Morshead, Mrs Browning, Bevan, and Warr (1900).

Æsculapius (Gr. *Asklēpios*) appears in Homer as the 'blameless physician,' of human origin; in the later legends, he has become the god of the healing art. The most common account makes him the son of Apollo and Coronis. He was brought up by Chiron, and instructed in the healing art, in which he soon surpassed his teacher, and succeeded so far as to restore the dead to life. Pluto, afraid that his realm would get no new inhabitants, therefore complained to Zeus, who slew the physician by a thunderbolt. After this he was raised to the rank of the gods by the gratitude of mankind, and was especially worshipped at Epidaurus, on the coast of Laconia. Here oriental elements, especially serpent-worship, seem to have been mingled with his rites and ceremonies. From Epidaurus the worship of the healing god extended itself over the whole of Greece, and even to Rome. According to Homer, Æsculapius left two sons, Machaon and Podalirius, who, as physicians, attended the Greek army. From them the race of the Asclepiades descended. Hygieia, Panaceia, and Ægle are represented as his daughters. The temples of Æsculapius usually stood outside of the cities in healthy situations, on hillsides, and near fountains. Patients that were cured of their ailments offered a cock or a goat to the god, and hung up a tablet in his temple, recording the name, the disease, and the manner of cure. Many of those votive tablets are still extant. The statue of the god at Epidaurus, formed of gold and ivory by Thrasymedes, represented Æsculapius as seated on a throne, and holding in one hand a staff with a snake coiled round it, the other hand resting on the head of a snake; a dog, as emblem of watchfulness, at the foot of the deity. Praxiteles and other sculptors represented the god as an ideal of manly beauty, closely resembling Zeus; with hair thrown up from the brow, and falling in curls on each side. The upper part of the body was naked, and the lower was covered by a mantle falling in folds from the shoulders. He had sometimes a laurel wreath on his head, and a cock or owl at his feet; or was attended by a dwarf-figure named Thelesphorus.—ASCLEPIADES, the followers of Æsculapius, who inherited and kept the secrets of the healing art; or, assuming that Æsculapius was merely a divine symbol, the Asclepiades must be regarded as a medical, priestly caste who preserved as mysteries the doctrines of medicine. The members of the caste, or medical order, were bound by an oath—the *Hippocratis jusjurandum*—not to divulge the secrets of their profession. Hippocrates is said to have descended from the Asclepiades of Cos, who traced their descent, on the mother's side, from Hercules.

Æsir, a race of gods in the Scandinavian Mythology (q.v.).

Æsop, the famous Greek fabulist, who lived in the later half of the 6th century B.C. He is supposed to have been originally a native of Phrygia and a slave, but to have been afterwards made free. He then visited the court of Crœsus, and gained his confidence to such an extent that he was sent on several missions, in one of which, to Delphi, he was thrown over a precipice by the priests, infuriated at his witty blasphemies. The traditions of his ugliness and his buffoonery may be dismissed. We know from Aristophanes that fables bearing the name of Æsop were popular at his time, and indeed we find that his name became in Greek literature a peg on which to hang anything in this form. The fables connected with his name were long transmitted through oral tradition. Socrates turned such of them as he could remember into verse during his imprisonment, and the same was done by Demetrius Phalereus. The only Greek version, however, of which any entire fables remain, and which, as shown by Bentley, has furnished materials to subsequent collections, is that of Babrius (q.v.). Later investigations have given to these ancient fables a still more venerable antiquity, in tracing some of them to the Birth-stories of Buddha; see JATAKA, BEAST-FABLES, FABLE, and Joseph Jacobs's introduction to his edition of the fables (1894). Some were known to the ancient Egyptians. For the *Ysopet*, see MARIE DE FRANCE.

Æsopus, CLAUDIUS, Roman actor, a contemporary and friend of Cicero, was as eminent in tragedy as Roscius was in comedy.

Æsthesiometer, an apparatus developed in connection with modern anthropometric and quantitative psychological research, and designed to determine the degree of tactile sensibility in the human skin and the various parts of the same. The simplest type resembles a pair of compasses with the points somewhat blunted. The two points are pressed on the skin, and the distance between them required to allow of their being felt or distinguished as two points and not as one, shown on a scale, indicates the degree of sensitiveness at that part of the body. Notoriously the distance has to be much greater on the back or on the thighs than, say, on the hands, fingers, or tongue, where sensitiveness is most acute.

Æsthetics might etymologically (as concerning *aisthēta*, things perceptible by the senses) be expected to mean the department of psychology concerned with sense-perception. But in modern philosophy it has long come to mean the science that deals with the principles of beauty or of taste; insomuch that in Britain in the last quarter of the 19th century *æsthete* came simply to mean a person who affected an exaggerated or even fatuously sentimental love of beauty, to the exclusion of practical considerations, true proportions, or art values. Æstheticism in this sense attached a fantastic significance to bric-à-brac, old china, dados, old gold curtains, sunflowers, an 'intense' manner, the ornamental and decorative generally; and extravagant aspects or tendencies provided a rich fund of material for raillery in Du Maurier's *Punch* cartoons and Gilbert and Sullivan's *Patience* (1881).

Æsthetica was first used for the principles of taste and of art by the Wolfian philosopher, Baumgarten; and though Kant, keeping nearer the meaning of the original Greek word, dealt in his *Transcendental Æsthetic* with the conditions of sensuous perception, Baumgarten's usage, as being convenient, became popular, and was established in Britain about 1830.

The name of Plato is bound up with the history of speculation on the Beautiful, which he never wholly separated from the Good. His position is far from precise, but it may be said that for him the beauty of finite things arises out of their participation in the eternal and ideal archetypes which constitute the keynote of all his speculations. Aristotle is more precise than his master, and left a body of valuable and still valid canons of criticism, especially for poetry. An Aristotelian dictum is, that the beautiful is that which is neither too large nor too small, a mean between extremes.

Baumgarten above mentioned (*circa* 1750) is the father of æsthetics as a well-defined system. According to him and his followers, sense is the lower intellectual power, understanding and reason the higher. As the true and the good are apprehended by the latter, the beautiful is grasped by the former; and æsthetics is a humbler stage of the intellectual energies.

Winckelmann did much to further æsthetic criticism by his examination of the principles of Greek sculpture; Lessing still more, by his attempt to distinguish, in his *Laocoön*, the province of poetry from that of painting and sculpture, and by excluding from the legitimate sphere of plastic art the representation of the repulsive and disgusting. Schiller was not merely a great poet, but a suggestive critic; and one of his trenchant maxims was that 'the annihilation or superseding of the *matter* by the *form* is the true art-secret of the master-artist.' The influence of Goethe by means of his *Wilhelm Meister* and other works, has probably influenced the thought of Europe still more.

Kant's *Critique of Judgment* deals with the *à priori* principles of emotion, of pleasure and pain, as intermediate between knowledge and volition, the judgment being æsthetical or teleological respectively; while the beautiful is analysed with reference to the four well-known categories of his system. Fichte and Schelling both included æsthetics in their schemes of philosophy; but the work of Hegel in this department attracted much more interest, and was for a time of paramount influence in Germany. With him, the beautiful is the absolute ideal realising itself; nothing is truly beautiful except this; nothing, therefore, which exists in concrete form can be so termed. Out of the sphere of the pure reason we have only an eternal aspiration. In the finite mind, the absolute ideal is always striving to realise itself, but never completely succeeds; there is only a ceaseless approximation. Beauty, whether of nature or history, is rare, accidental, fugitive, and tarnished by intermixture with the not-beautiful. The beautiful first passes into self-recognition in the dawn of human intelligence, and its conscious realisation of itself increases in proportion to the culture of the race or the individual. The highest finite realisation of it is Art; for though the form of art be material, it is matter shaped according to an idea. The artist looks on the form simply as the objective embodiment of the idea. Form, though springing out of matter, is thus a deliverance from matter, and the particular arts may consequently be regarded as the gradual working of the mind out of materialism. The formative arts—Architecture, Sculpture, Painting—are silent, heavy, still partly material. Music is an advance on these, and breathes in a higher region; the materialism of Sound becomes all but ideal. Poetry is a further advance. It is the pathway of the intellect to pure thought.

Herbart and the Realists, including Zimmermann, directly opposed the Hegelian theory. For them, æsthetics is that branch of philosophy which deals with the forms by which any subject of thought provokes pleasure or the reverse, whether it be a representation of a reality or a pure invention of the imagination; a picture does not gain in *beauty* by reality, though it may gain in *truth*. Vischer and Carrière, Schopenhauer and Kirchmann, Fechner and Lotze, amongst German systematists, have all copiously dealt with æsthetics.

In France, Diderot and Père Buffier propounded theories of beauty. The founder of the Eclectic School of Philosophy, Victor Cousin, eloquently expounded the Platonic view.

In Britain, the first publication on this subject of any consequence—if we except Lord Shaftesbury's *Characteristics*, in which there is set forth a 'rapturous Platonic doctrine'—was Hutcheson's *Inquiry* (1725). In this work, the existence of an 'internal sense,' through which we either obtain a perception of the beautiful, or are made in some way conscious of its presence, was maintained.

Burke, in his famous *Treatise on the Sublime and the Beautiful* (1756), relies mainly on physiological considerations. Amongst the elements of beauty are smallness, smoothness, variety of outline, delicacy, brightness and softness of colour. 'All objects appear beautiful which have the power of producing a peculiar relaxation of our nerves and fibres.'

Sir Joshua Reynolds, borrowing from Père Buffier, treated beauty as the mean between two extremes. Hogarth's more ingenious and acute *Analysis of Beauty* emphasises fitness, variety, symmetry, intricacy with simplicity and distinctness, and size.

Alison's *Essays on the Nature and Principles of Taste* (1790) propounded the theory of Association. Jeffrey, in his famous essay, substantially adopts and expounds Alison's views. According to Jeffrey, 'these emotions (that is, those excited by the contemplation of certain objects) are not original emotions, nor produced directly by any qualities in the objects which excite them; but are reflections or images of the more radical and familiar emotions to which we have already alluded, and are occasioned not by any inherent virtue in the objects before us, but by the accidents, if we may so express ourselves, by which these may have been enabled to suggest or recall to us our own past sensations or sympathies.' He explicitly denies that there is any independent or intrinsic beauty in form.

Sir William Hamilton distinguishes beauty into Absolute and Relative. 'In the former case,' he says, 'it is not necessary to have a notion of what the object ought to be before we pronounce it beautiful or not; in the latter case, such a previous notion is required.' In the case of free or absolute beauty, 'both the imagination and the understanding find occupation; and the pleasure we experience from such an object is in proportion as it affords to these faculties the opportunity of exerting fully and freely their respective energies. The beautiful is that whose form occupies the imagination and the understanding in a free, full, and consequently an agreeable activity.'

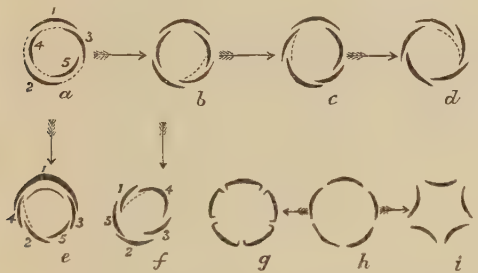
Ruskin did a great deal to awaken and extend the appreciation and enjoyment of art in Britain, and in several of his works discusses æsthetic theories; especially in *Modern Painters* he has attempted a systematic exposition of our ideas of beauty. Beauty is typical or vital, the former falling under the heads of infinity, unity, repose, symmetry, purity, moderation—all typical of divine attributes; while vital beauty is relative or generic. Ruskin's position is that of an extreme spiritualist, and takes no account of the value of association at all.

Bain, a prominent representative of the empirical school, has largely treated of æsthetics in his work on *The Emotions and the Will*, and has made an elaborate analysis of the elements in our perception and enjoyment of beauty. Herbert Spencer has endeavoured to establish an original theory of the origin of our pleasure in beauty and art, based on the doctrine of evolution as developed by him.

Others who have contributed to the discussion of the problem are Jean Paul Richter in Germany; in France, Jouffroy and Taine; and in Britain, Reid, Addison, Dugald Stewart, and Lord Kames. Schasler, Zimmermann, Lotze, and Carrière have written in Germany works on the history of

æsthetics; in France, Lévêque; and in his *Æsthetics* (trans. 1909) Benedetto Croce has made an important contribution to the science. American writers are Jarves, Bascom, Kedney, and Torrey. See ART, ASSOCIATION OF IDEAS, EMOTION; Hegel's *Phil. of Fine Art* (transl. by Bosanquet, 1887); Lotze's *Outlines of Æsthetics* (trans. by Ladd, 1887), and Bosanquet's *History of Æsthetics* (1892).

Æstivation (Lat. *æstivus*, 'belonging to summer'), or PRÆFLORATION, a term employed to denote the manner in which the sepals and petals are disposed in the flower-bud. The different modes of æstivation are different solutions of the problem of packing the floral envelopes into smallest bulk, and some of the arrangements are apparently the results of twisting. The æstivation of the sepals is often different from that of the petals. The



Various forms of Æstivation regarded as modification of the quincuncial or valvate type:

a, quincuncial; *b*, half-imbricate; *c*, imbricate; *d*, contorted; *e*, vexillary; *f*, cochleate; *h*, valvate; *g*, valvate induplicate; *i*, valvate reduplicate.

precise arrangement in a flower can be readily seen by making a cross section of the bud, but some of the commonest forms may be noted. When the parts meet but do not overlap, the arrangement is called *valvate;* but if the adjacent margins are turned inwards or outwards, the terms *induplicate* and *reduplicate* are used. In many cases, each part overlaps its neighbour at one margin, and is still overlapped at the other, and to this the term *contorted* is applied. In *imbricate* æstivation, the parts successively overlap from the first, which is wholly external, to the last, which is wholly internal. The term *quincuncial* is applied to an exceedingly common arrangement in which two parts are external, two internal, while the fifth overlaps one of the internal parts and is overlapped by one of the external. In the papilionaceous corolla (see LEGUMINOSÆ), the standard overlaps the wings, while they overlap the keel. In the poppy, the petals are much crumpled in the bud.

Ætheling. See ATHELING.

Æther. See ETHER.

Æthrioscope is an instrument for measuring the minute variations of temperature due to the condition of the sky, and consists of a differential Thermometer (q.v.) whose bulbs are both within a cup-shaped mirror, one being in the focus of the mirror.

Ætiology, or ETIOLOGY (Gr. *aitia*, 'cause,' and *logia*, 'discourse'), the science or philosophy of causes and causation, especially (1) the department of biology, which seeks to give a scientific account of the factors operative in the evolution of organisms (see DARWINIAN THEORY, and EVOLUTION); (2) the branch of medicine which investigates the causes and origin of diseases.

Aëtius, a great Roman general, born in Mœsia towards the end of the 4th century A.D. He was for a time a hostage amongst the Huns. He led an army of Huns to the support of the usurping Emperor John; and by help of the Huns compelled the empress-mother Placidia to advance himself at the expense of his rival Bonifacius. In 433 he became patrician, consul, and general-in-chief; and as such maintained the empire against the barbarians for twenty years, defeating West Goths, Burgundians, rebellious Gauls, and Franks. But his 'crowning victory' was that at Châlons over Attila (q.v.) in 451. In 454 the Emperor Valentinian III. (q.v.), jealous of his greatness, stabbed him to death with his own hand.

Ætna. See ETNA.

Ætolia, a district of ancient Greece, lying on the N. coast of the Gulf of Corinth. It was divided from Acarnania by the river *Achelous*, and on the N. touched Thessaly. In later times, these boundaries were considerably extended to the N. and E. The country had few cities; was, except on the coast, generally wild and barren. Here, according to the legend, Meleager slew the Calydonian boar. The Ætolians make a great figure in the heroic age of Greece; but at the time of the Peloponnesian war, they were rude and barbarous. The Ætolian Confederacy, first called into existence about 323 B.C., became an important rival to the Achæan League (see ACHAIA). Their assembly was styled the *Panætolicon.* They sided with the Romans against the Achæan League, but afterwards aided Antiochus III. against the Romans, and were subjugated by the Romans in 189 B.C., though not formally included in a Roman province till 146. Along with Acarnania, Ætolia now forms a department of the modern kingdom of Greece, with a united area of over 3000 sq. m. The mountains in the NE. are offsets of the Pindus chain, and slope steeply on the SW. down to the central plains. The chief towns are Missolonghi and Lepanto.

Affidavit (from the perfect tense of a barbarous Latin verb, *affido*—e.g. *A.B. affidavit*, 'A.B. hath sworn'), an oath in writing, or a written declaration made before a magistrate, or other person legally authorised to administer an oath, the truth of which is confirmed either by an oath sworn, or a solemn affirmation emitted in terms of the Oaths Act, 1888 (51 and 52 Vict. chap. 46), and the other statutes referred to under AFFIRMATION. Where evidence is required in England to be laid before a court, it is frequently given by affidavit, and not by oral examination. This is almost invariably the case on interlocutory applications before trial—e.g. for discovery of documents. Many isolated facts are proved by affidavit—e.g. service of proceedings; the condition of a will with alterations of which probate is asked, &c. Where the whole evidence is given by affidavit, a practice discouraged in England since the union of the Common Law and Equity Courts, the plaintiff first files his affidavits in chief, and these are replied to by the defendant's affidavits. The affidavit consists of title, body or statement, and jurat. An affidavit ought to set forth the matter of fact only, and not to declare the merits of the cause, of which the court is to judge. The name, place of abode, and designation of the party making the affidavit are written at length, and he signs it at the foot. When the paper is shown to him, he is required to swear or affirm that its contents are true, and that the name and handwriting are his. Affidavits in all the English courts must be taken and expressed in the first person of the deponent, and are divided into paragraphs numbered consecutively. The *Jurat* specifies the officer before whom, the place where, and the time when it was sworn, and this is signed by the officer or magistrate. When an affidavit is sworn in open court, that circumstance is mentioned, and no officer is named. Under the

Bankruptcy Act, 1883, the expression 'affidavit' includes statutory declarations, affirmations, and attestations on honour. In Scotland voluntary affidavits are not generally received as evidence, because they are *ex parte* statements, no opportunity being afforded for cross-examination. But in certain matters affidavits are required by statute —e.g. under the Bankruptcy Acts, the Confirmation of Executors Act, &c. An affidavit is sometimes required also at common law, as in applications for warrants *in meditatione fugæ*, and, as in England, on various interlocutory applications—e.g. for postponement of trial, or for commission to examine before trial sick and aged witnesses. Apart from judicial proceedings, affidavits are required by imperial statutes in a great many circumstances which make a deliberate and formal statement, under the sanctions of perjury, desirable in the public interest. Under English law affidavits may be sworn before a person authorised to administer oaths in the High Court, or before any registrar of a bankruptcy court, or before a justice of the peace. In the United States the law is very similar. The affidavit of parties to a cause is received upon incidental questions addressed to the court, and auxiliary matters not affecting the issue. An affidavit made solely on information or belief is not sufficient for the arrest of any person charged with an offence against the laws of the United States.

Affiliation, or FILIATION, is the name given to an action brought in the sheriff courts in Scotland by the mother of a bastard to recover aliment from the putative father. It is the equivalent of the proceeding for a Bastardy Order before the justices in England. The old common-law rules as to the evidence required to prove paternity in such cases have been modified, since the Evidence Act of 1853 made the parties to the action competent witnesses. The rates of aliment allowed against the father vary in different districts in Scotland; in Glasgow it is £8 per annum until the age of 7 or 10, or some other fixed age, when the mother's right of custody expires, and the father may make his arrangements for the child's maintenance. A debt of this nature may still be enforced by imprisonment. There are risks of fraud and extortion in affiliation proceedings, and it is settled in Scotland, and has been expressly enacted in England, that to establish paternity there must be evidence corroborating the statement of the pursuer.

Affinity (Lat. *affinitas*), the relationship created by marriage between the husband and the blood-relations of the wife, and between the wife and the blood-relations of the husband. The relatives of the wife stand to the husband in the same degree of affinity in which they stand to the wife by blood or consanguinity, and *vice versâ*. But between the relatives of the two parties by affinity there is no affinity. Thus there is no affinity between the husband's brother and the wife's sister, and by our law there is no impediment to their marriage. The question as to whether those who are related by affinity stand in all respects in the same position as regards marriage with those connected by blood is one on which much difference of opinion at present prevails. The general rule of English and Scots law is that intermarriage is prohibited between persons within the third degree of consanguinity, and also intermarriage with the wife or husband of any one so related. But the Deceased Wife's Sister's Marriage Act, 1907, legalises the marriage with a deceased wife's sister or half-sister as a civil contract The act does not legalise a marriage with the sister of a divorced wife. The Deceased Brother's Widow's Marriage Act, 1921, legalises marriage with a deceased husband's brother. In the United States the law is substantially as in England: a person cannot by legal succession receive an inheritance from a relation by affinity. See CONSANGUINITY, DECEASED WIFE'S SISTER, MARRIAGE; for the anthropological aspect, FAMILY, KIN.—For Chemical Affinity, see under that head.

Affirmation is a solemn declaration now admitted in lieu of an Oath (q.v.) in all cases where a witness objects to being sworn, and states, as the ground of such objection, either that he has no religious belief or that the taking of an oath is contrary to his religious belief. The form of affirmation prescribed by the Oaths Act, 1888, is: 'I, A. B., do solemnly, sincerely, and truly declare and affirm.' By this act the profession of allegiance to the crown exacted from members of parliament may also now be made by affirmation. The earlier statutes which were passed from time to time giving relief to Quakers and others who had conscientious scruples against taking an oath have, in view of the general relief given by this act, been repealed. Under the Perjury Act, 1911, the penalties of perjury attach to the wilful making of a statement known to be false, equally whether the statement was made on oath or on affirmation. In the case of certain offences against children, a child in England is now permitted by recent statutes to give evidence without being sworn if it understands the duty of speaking the truth. In Scotland the evidence of children too young to be sworn is admissible in the discretion of the judge.

Afforestation. See FORESTRY.

Affre, DENIS AUGUSTE, was born 27th September 1793, and in 1840, on account of his prudent and temperate character, was made Archbishop of Paris by the government of Louis Philippe. Though not yielding a blind submission to all the measures of that government, he abstained from offensive opposition; and when in 1848 a republic was proclaimed, he kept aloof from political strife, but displayed earnest care for the public welfare. During the June insurrection he climbed on a barricade in the Place de la Bastille, carrying a green bough in his hand, as a messenger of peace; but he had scarcely uttered a few words when the firing recommenced, and he fell mortally wounded, to die next day, June 27. He was the author of several theological writings, and of a work on Egyptian hieroglyphics. It should be added that his death was due to a casual bullet, not aimed at him at all, and that the accident was sincerely regretted by the leading revolutionists.

Affrontée, in Heraldry, fronting the beholder, as the lion sejant affrontée, the crest of Scotland.

Afghanistan is the country lying to the north-west of India. Its boundaries are, on the north, the Oxus or Amu Daria, from its source in Lake Victoria or Sir-i-Kul to Khoja Saleh, and thence a line drawn across the Turkoman desert south-westward to the Murghab, passing south of Panjdeh, and touching the Hari-Rud at Zulfikar. This line has been demarcated in accordance with the London protocol of 1885 and the St Petersburg treaty of 1887. On the north-east Afghanistan is bordered by a mountainous region, inhabited by tribes of various nationalities, but for the most part speaking Afghan dialects, and settled in the fertile but almost inaccessible valleys of the Upper Indus and its tributaries. On the east the frontier has been affected by the agreements of 1893–1919. On the south a line passing north and west of Quetta, and then running westwards, following approximately the 30th parallel of N. lat., divides Afghanistan from Baluchistan; while on the west the meridian of 61° E. long. would approximately define the boundary with Persia.

Within these limits, Afghanistan extends 400 miles from north to south, and 600 miles from east to west, and contains an area which may be roughly estimated at 240,000 sq. m., or about twice the size of Great Britain and Ireland. This includes Badakhshan and Wakhan in the north-east, and Afghan Turkestan in the north, comprising the Uzbeg States of Balkh, Kundúz, Maimana, Shibarghan, Khulm, Akchá, and Andkhói, owning allegiance and paying tribute to the Amir. Afghanistan may be divided into the three great river-basins of the Oxus, the Indus, and the Helmand. (1) Oxus basin. The northern slopes of the Hindu Kush are drained by a number of rivers flowing northwards towards the Oxus; only two, however—the Kokcha and Kunduz—reaching that river, while the remainder are either absorbed in irrigation, or disappear in the sands. The westernmost of the series—the Murghab and Hari-Rud—are of great importance, owing to the geographical position and fertility of their valleys, affording two lines of approach to Herat from the north. (2) The Indus basin includes the great basin of the Kabul itself and its tributaries, draining the southern slopes of the Hindu Kush and the northern valleys of the Safed-Koh; the basin of the Kuram, commanding a well-known approach to Kabul from the Indian frontier at Thal; and the streams issuing from the Waziri hills and Suliman range. (3) The Helmand, with its three great

tributaries, the Argandab, Tarnak, and Arghastan, drains all South-western Afghanistan. Afghanistan is for the most part an arid, mountainous country, and cultivation is only met with in some of its valleys.

According to Holdich, the principal mountain systems of Afghanistan are the Hindu Kush, with its westerly continuations, the Koh-i-Baba, Paghman, Safed-Koh, and Siah-Koh. The Hindu Kush takes its rise in the north-east, where it abuts on the north-western end of the Himalayas in a group of magnificent peaks, rising to a height of 23,000 feet above the sea. Hence it extends in a south-westerly direction to the Khawak Pass as a single range of great height. Farther west it diminishes in altitude, and divides into a system of parallel chains, with high plateaus and valleys between them. The Safed-Koh, not to be confounded with the range of the same name in North-western Afghanistan, divides the Kabul from the Kuram, and has no geographical connection with the Hindu Kush, while the Suliman hills are now included in India, not in Afghanistan. The climate of Afghanistan is as diversified as its physical configuration. At Ghazni (7279 feet) the winter is extremely rigorous, and for several months the inhabitants are snowed up in their houses. At Kabul (5600 feet) the cold is severe for two or three months, but the summers are temperate. At Kandahar the winters are milder, but the heat in summer is intense (110° F. in the shade). The climate of Seistan, in the south-west of Afghanistan, is hot and trying; while that of Herat, in the north-west, is temperate; though here, as in other parts of Afghanistan, violent north-westerly winds and dust-storms are frequent.

Fevers, intermittent and remittent, and diseases of the eye, are among the most common complaints of the Afghans. The population of Afghanistan is composed of a variety of nationalities, and is estimated at about 6,400,000. The Afghans proper, or Pathans, number about 3,000,000, and are divided into tribes or clans—Duránis, Ghilzáis, Yúsufzáis, and others. The

Duránis are the dominant tribe; the Ghilzáis, the strongest and most warlike; the Yúsufzáis, the most turbulent. Of the non-Afghans, the Tajiks are probably the most numerous, and are the agricultural and industrious portion of the population; the Hindkís and Játs chiefly live in the towns, and are traders; the Kizilbashes are Turko-Persians, and form the more educated and superior class; while the Hazáras, a race of Mongol origin, in the mountainous districts on the north-west of Afghanistan proper, are nomads. The Afghans claim descent from King Saul, and call themselves 'Bani Israel;' but though their features are of a Jewish type, and some of their customs have a curious analogy to those of the Jews, their language—the Pakhtu or Pushtu—has no affinity with the Semitic tongue, but rather belongs to the Aryan family. In religion they are Sunni-Mohammedans. In character they are proud, vain, cruel, perfidious, extremely avaricious, revengeful, selfish, merciless, and idle. 'Nothing is finer than their physique, or worse than their morale,' says an intelligent observer.

The Afghans do not as a rule inhabit towns, except in the case of those attached to the court and heads of tribes. The townsmen are mostly Hindkís and other non-Afghan races, who practise various trades and handicrafts considered derogatory by men of rank. The houses or castles in the country are all inclosed by high walls, and contain three or four different courts, laid out in gardens, with ponds and fountains, much the same as in Persia and Turkestan. The principal towns are Kabul (population 140,000), the seat of government and centre of a fertile district; Ghazni, a strong fortress; Kandahar, the chief city of Southern Afghanistan, with 30,000 inhabitants; and Herat, formerly considered the key of India. Among towns of secondary importance are Charikar, Istalif, 20 miles NNW. of Kabul, and Farah in Seistan.

Among the natural productions of Afghanistan is the plant yielding the asafœtida. The castor-oil plant is everywhere common, and good tobacco is grown in the district of Kandahar. Aitchison says that the cultivated area round Herat produces magnificent crops of wheat, barley, cotton, grapes, melons, and the mulberry-tree; the production being only limited by the amount of labour procurable. Surrounding the villages, and in orchards, the ash, elm, apricot, apple, plum, quince, peach, and pomegranate are cultivated; the sanjit (*Elæagnus orientalis*), yielding an edible fruit, and the zizyphus are indigenous. In special localities are forests of pistachio, its leaves being used in dyeing. The general appearance of the country during winter is barren and arid in the extreme, owing to the absence of trees and woody shrubs; but in spring a mass of vegetation springs up, giving a grand colouring to the landscape. The industrial products are silk, chiefly for domestic use, and carpets, those of Herat being of admirable quality. The manufacture of *postins*, or sheepskins, is one of the most important of the industrial occupations of the people, and of late years the trade in this article has greatly increased. Afghanistan is crossed by several trade-routes leading to India on the one side, and to Persia and Turkestan on the other; merchandise, however, is all transported on camel or pony back. Commerce suffers much from frequent wars and bad government. There is, however, some export of Afghan productions, particularly carpets to India; and Indian textile fabrics meet with a ready sale in Afghanistan.

History.—Afghanistan as an independent state dates only from the middle of the 18th century. For two centuries before, Herat and Kandahar had been in the possession of Persia; while Kabul was included in the Mogul empire of Delhi. Upon the death of Nadir Shah in 1747, Ahmed Shah Duráni subjugated the different provinces, and when he died in 1773, left an empire to his son, Timur Shah, extending to the sea of Oman on the south, and on the east to the mountains of Tibet, the Sutlej, and the Indus. Timur Shah reigned twenty years, and dying in 1793, left thirty-six children, of whom twenty-three were sons. The rivalries and jealousies among these princes or sirdars, their attempts to concentrate absolute power in their own hands, their turbulence, cruelty, and treachery, kept Afghanistan in a constant state of warfare, and led to the interference, first of Persia, and then of the British. In 1809 Mountstuart Elphinstone was sent as ambassador to Kabul, and concluded a treaty with Shah Shuja, son of Timur Shah, at Peshawar. Shah Shuja soon afterwards abdicated, and his brother, Mahmud Shah, took possession of the throne. His vizier, Futteh Khan, restored prosperity to Afghanistan for a while, but was blinded and afterwards murdered. His death was avenged by his brothers, the ablest of whom, Dost Mohammed, made himself master of Kabul in 1826.

In 1834 Shah Shuja made an effort to recover his throne, and entered Afghanistan with an army of twenty thousand Afghans and Hindustanis, but was defeated by Dost Mohammed. The siege of Herat by the Persians in 1837, when it was successfully defended mainly through the exertions of Lieutenant Eldred Pottinger, and Dost Mohammed's signal victory over the Sikhs, attracted the serious attention of the British government. Lord Auckland, then governor-general, declared war against Afghanistan in 1838, on the grounds that Dost Mohammed had unlawfully attacked the British ally, Runjit Singh; that the military operations of the Afghans had betrayed a hostile purpose towards India, and that Shah Shuja, as the rightful heir to the Afghan throne, had placed himself under British protection. It was designed to establish a friendly power in Afghanistan, which should form the first line of defence against the threatened advance of Russia on India. In pursuance of this policy, on the 16th January 1839, an army of 21,000 men, under the command of Lieutenant-general Sir John Keane, crossed the Indus, advanced without opposition through the Bolan Pass, and took possession of Kandahar. Ghazni was taken after some hard fighting, and on the 7th August, the Anglo-Indian army entered Kabul, where Shah Shuja was proclaimed Ameer. Dost Mohammed, deserted by his forces, retired beyond the Hindu Kush, and the conquest was regarded as complete. Sir William Macnaghten and Sir Alexander Burnes were established at Kabul as British political agents; and a body of Anglo-Indian troops was stationed there under General Elphinstone.

Events, however, soon showed that the British had altogether mistaken the character of the Afghans. Though Dost Mohammed had surrendered, his son Akbar Khan was actively engaged in a conspiracy, and on the 2d November 1841 an insurrection, caused, it is said, by the reduction of subsidies to the Afghan sirdars, broke out at Kabul. Burnes and his brother were hacked to pieces with Afghan knives, Macnaghten was treacherously shot seven weeks later at a conference with the Afghan sirdars, several British officers were slain, and the Anglo-Indian army, after being besieged in cantonments for sixty-five days, capitulated. It was then agreed that they should leave the country, and that Akbar Khan and his confederates should make arrangements for their retreat, and provide an escort. Depending on these promises, the British troops left Kabul on the 6th

January 1842, to return to India; but neither escort nor provisions were supplied, and the severity of the season increased the misery of the retreat. The fanatical tribes of the district harassed them on all sides, and out of 16,500, of whom 12,500 were camp-followers, only one man (Dr Brydon) escaped to carry the dismal tidings to General Sale at Jelalabad. To retrieve this disaster, General Pollock, in September 1842, advanced on Kabul, routed Akbar Khan, and having inflicted punishment on the Afghans, and rescued the English officers and ladies who had surrendered themselves as prisoners, led his army back to India.

Henceforward the policy of the new governor-general, Lord Ellenborough, was to be one of non-interference in the affairs of Afghanistan, and it was hoped that the Afghans would keep the peace. Soon afterwards, however, forming an alliance with the Sikhs, they assisted them in their war against the British, till a crushing defeat was inflicted on their combined forces by Lord Gough, at the battle of Guzerat, on the 21st February 1849, and Dost Mohammed fled across the Indus. On the 30th March 1855, he concluded a treaty with the British, and in 1863, soon after the capture of Herat, which he had besieged for ten months, he died, and was succeeded by Shere Ali Khan, one of his younger sons. At first, the choice was acquiesced in by the other brothers, but disagreements soon arose, which for many years kept Afghanistan in a state of anarchy, and at one time the fortunes of the Amir Shere Ali Khan were at a low ebb. The loss of a favourite son at the battle of Kajbáz (on the 6th June 1865) affected him so seriously that he ceased to interest himself in public affairs, and remained at Kandahar, while his rebellious half-brothers, Mohammed Afzul Khan, and Mohammed Azim Khan, with Abdul Rahman Khan, the son of the former, were gaining repeated successes, and alienating the country from his rule. The capture of Kabul at length aroused him to action. Taking the command of his forces in person, he led them against the entrenched position of the enemy; but notwithstanding the impetuosity of the assault, and his personal gallantry, he was defeated, and fled with a small following towards Ghazni and Kandahar. Other attempts to restore his fallen fortunes were equally unsuccessful, and it was not till 1868 that he at length regained possession of Kabul. In that year he received assistance from the viceroy of India, Sir John Lawrence, to secure the position for which he had fought so hard. The next viceroy, Lord Mayo, met the Amir in state at Ambála in March 1869. At this meeting it was explained to him that Her Majesty's government had no desire to interfere with the affairs of Afghanistan, except to check civil war, and by so doing, to secure the peace and prosperity of the country. This intimation was accompanied by another large present.

In 1870 the Amir's eldest son, Yákúb Khan, who had shown great ability as governor of Herat, and had, on many occasions, given his father valuable assistance, broke into open rebellion against him. In 1873 Abdulla Ján was proclaimed heir-apparent, and in 1874 Yákúb was imprisoned by his father at Kabul. For some time previous to 1878 there had been an estrangement between Shere Ali and the British government; he had then made overtures to Russia, and had welcomed at his capital a Russian mission. In consequence of these new relations with Russia, Shere Ali was invited to receive a British mission; his refusal led, after some fruitless negotiations, to war, and hostilities began by forcing the entrance to the Khyber Pass towards the end of November. Severe fighting followed, but the English were everywhere successful. Before the end of December, Jelalabad was occupied without resistance, and Kandahar a little later. Shere Ali fled from Kabul for Turkestan, and died at Mazar-i-Sharif towards the end of February 1879. Yákúb Khan (1849–1923) was proclaimed Amir in the following month, and on the 26th May signed a treaty of peace with the British at Gandamak. It was provided that our representative should reside at Kabul, and that the British government should defend Afghanistan from foreign aggression, the Amir receiving a subsidy; whilst the Kuram, Pishin, and Sibi valleys, the Khyber and Michni passes, were to remain under the control of the British government as part of a line of scientific defensible frontier for India. This settled matters for a time, but in September of the same year, the revolted troops of the Amir surrounded and attacked the British residency. The Resident, Sir Louis Cavagnari, and his staff, with almost the whole of their Indian guard, were cut to pieces, after a desperate and gallant resistance. Measures were immediately adopted for punishing this outrage. Sir F. Roberts, with a force of over 6000 men, after defeating the Afghans at Charásia, 12 miles from Kabul, on the 6th October, took possession of that city on the 12th, when Yákúb Khan abdicated, and put himself under British protection. All went well for two months, but early in December there were gatherings of the tribes in the neighbourhood of Kabul. Attempts to disperse them were defeated, and the British were beleaguered for ten days in their cantonments at Sherpur. The arrival of reinforcements, under General Gough, enabled them once more to take the field, and the war was continued in a desultory way.

In June 1880 Ayub Khan, a younger brother of Yákúb Khan, the ex-Amir, proclaimed a *ghaza*, or holy war, and announced his intention of marching on Kandahar, then in the possession of the British. A brigade under Brigadier-general Burrows was sent against him. On the 27th July, Burrows marched to attack Ayub at Maiwand, and was completely defeated, with the loss of over 1000 killed and wounded. A second reverse followed in August, when Brigadier-general Brooke's column was attacked, and had to retire with heavy loss, that officer being killed. Abdul Rahman Khan, who had been a pensioner of the Russian government in Samarkand from 1870 to 1880, in the meanwhile had come to terms with the British government, and had in July been recognised as Amir. The withdrawal of the army of occupation had been decided on, when news of the Maiwand disaster was brought. To avenge this, General Roberts marched with a force from Kabul on the 9th August, and reached Kandahar on the 31st. On the following day he totally defeated Ayub Khan, the Afghan camp, artillery, and baggage falling into his hands, whilst Ayub himself escaped with a handful of horse. Before withdrawing, the British troops reduced to submission some refractory tribes, and completed the evacuation of Afghanistan by the end of April 1881. Abdul Rahman Khan, with the assistance of the British government, made himself master of the whole country.

Russia's proposal, in 1882, to delimit the frontier of Afghanistan was received coldly in England. In July 1884, however, a commission was appointed to demarcate the boundary between Afghanistan and the territory of the Turkomans. General Sir Peter Lumsden was nominated by the British government, and General Zelenoi by the Russian. The line on which the commissioners were to be engaged was from Kwája Sala on the Oxus, to Sarakhs. But after the annexation of Merv and the preliminary surveys of M. Lessar, in the valleys of the Khushk and Murghab, the Russian authorities took a different view. They

contended that the Paropamisus was the true boundary of Herat, and that the district of Badghis, inhabited by Saryk Turkomans, who had proffered their allegiance to the Tsar, lay outside Afghan territory. Questions of such grave moment, it was further stated, required to be settled by the two European governments before the commissioners could enter on their duties, and General Zelenoi was, without further explanation, sent to Tiflis. General Lumsden waited for him for four months on the Murghab, with an escort of 500 men, besides followers. In the meanwhile, the Russian outposts were advanced so as to include part of the debatable land. By their occupation of Zulfikar, 50 miles south of Pul-i-Khatun, the outposts of the two nations were brought into immediate contact, and it was only through the urgent remonstrances of General Lumsden that a collision was avoided. Matters were further complicated by the attack on Panjdeh, near the fork of the Khushk and Murghab rivers, by a force under the command of General Komaroff, on the 30th March 1885, and by his seizure of this important strategical position. During 1886 the demarcation of the frontier was proceeded with, and in April 1887 the British and Russian commissioners met at St Petersburg. Protracted negotiations resulted in a compromise of the points at issue. The Amir of Bokhara waived his claims to the pasture-lands on the left bank of the Amu Daria, south of Khoja Saleh. Russia obtained the valleys south of Panjdeh for 9 or 10 miles towards Herat, and so touched the north-western frontier of Afghanistan. Britain fortified and garrisoned Quetta in Baluchistan, on the southern border of Afghanistan, and connected it with India by a railway extended to New Chaman. In 1893 the Amir agreed to a rectification of frontier, excluding Chitral, Swat, Waziristan, and Bajaur, but including Kafiristan. Abdul Rahman died in 1901. On the assassination of his son Habibullah Khan, the Amir Amanullah Khan waged a short war upon the British (1919), and the Indian government relinquished its control of Afghanistan's external affairs. Amanullah took the title of king in 1926.

See Elphinstone's *Cabul* and Kaye's *War in Afghanistan*, and more recent works by Malleson (1878), Bellew, Raverty, Wheeler, Oliver, Daly, Gray, Holdich, Pennell (1909), Tate (1911), Ikbal Ali Shah (1928).

Afium-Kara-Hissar ('Opium Black Castle'), a city of Asia Minor, 170 miles ENE. of Smyrna; pop. 20,000.

Africa, a continent of the eastern hemisphere, forming a south-western extension of Asia, to which it has been attached since Eocene times by the narrow isthmus of Suez, now pierced by a canal 90 miles long. Africa is thus constituted an insular mass of irregular triangular shape, with base on the Mediterranean, and apex at the junction of the Indian and Atlantic waters, which bathe its eastern and western shores respectively. From Cape Blanco (37° 19′ 40″ N.) at Bizerta, Tunis, to Cape Agulhas (34° 51′ 15″ S.) in the Cape Province, it stretches across 72° of latitude, or about 5000 miles, disposed nearly equally on both sides of the equator. The extreme eastern and western points are Capes Guardafui (51° 14′ E.) on the Indian Ocean, and Verde (17° 32′ W.) on the Atlantic, a distance of about 4500 miles. But owing to the sudden contraction of the land at the Gulf of Guinea (4° 30′ N.), whence, like both Americas, India, and other peninsular masses, it tapers continuously southwards, the total area is considerably less than would seem to be indicated by these extreme distances. Including Madagascar and all adjacent insular groups, it cannot be estimated at much more than 11,950,000 sq. m., or some 4,000,000 less than Asia or America. Of all the continents except Australia, Africa is the most uniform, heavy, and monotonous in its general outlines, unbroken by any bold projections seawards except the abortive Somáli Peninsula, unrelieved by broad estuaries, bights, or inlets of any kind penetrating far inland, diversified only by the Gulfs of Cabes and Sidra (the Great and Little Syrtes) on the Mediterranean, by the Bight of Biafra at the head of the Gulf of Guinea on the Atlantic, and by the Gulf of Aden, Red Sea, and Gulf of Suez, separating it on the east side from the Asiatic mainland. Hence, although about three times larger than Europe, its coast-line scarcely exceeds 15,000 miles, as compared with the 19,000 of that more highly favoured continent.

Islands.—Geologically, Africa is nearly destitute of insular groups, almost the only islands that belong physically to the mainland being Ierba and one or two islets in the Mediterranean, and a few on the east side, such as Socotra, the 'spear-head' of the Somáli Peninsula terminating at Cape Guardafui, and farther south, Pemba, Zanzibar, and Mafia, almost forming parts of the adjacent coast. Perim, Dahlak, and a few others in the Red Sea, are mere coral reefs, dominated here and there by volcanic crests. The Comoro group between Madagascar and Mozambique is also volcanic; while Madagascar itself and the outlying Mascarenhas (Mauritius, Réunion, and Rodriguez) appear to be surviving fragments of a Miocene continent, now flooded by the waters of the Indian Ocean. On the west side, the little Bissagos group alone forms a geological dependency of the mainland. Annabon, St Thomas, Prince, and Fernando Po, in the Gulf of Guinea, as well as Madeira, the Canary, and Cape Verde archipelagoes, are all of volcanic origin, the latter being separated by profound abysses of over 3000 feet from the continent. Lastly, St Helena and Ascension are mere rocks lost amid the Atlantic waters.

Relief of the Land.—Corresponding with the somewhat shapeless and uniform continental contour, is the generally monotonous character of the interior, which is relieved by no great central highlands or conspicuous water-partings at all comparable to those of the other great continental regions. Although it is not yet completely explored, the lie of the land is already sufficiently understood, at least in the main features of its general relief. We now know that the somewhat premature generalisation, which compared it to 'an inverted basin,' gives a very inadequate, if not absolutely misleading idea of its true conformation. The outer rim of mountain-ranges is not nearly so continuous and uniform as this comparison would imply; while the interior is disposed, not in one vast elevated plain, but in two well-marked physical regions—a great southern tableland with a mean altitude of over 3500 feet, falling northwards to a much lower but still elevated plain with a mean altitude of about 1300 feet. Owing to this generally high altitude, and to the almost total absence of extensive low-lying plains, such as the Russian steppes and Siberian tundras, Africa, notwithstanding the lack of vast alpine regions like the European Alps and Pyrenees, or the Asiatic Himalayas and Kuenlun, has nevertheless a greater mean elevation (1900 to 2000 feet, Chavanne) than either Europe (950 to 1000), or perhaps even America (1900).

A line running from the Cameroons northwards to the Benue, and sweeping round Mount Alantika (last northern outpost of the tableland in Adamáwa), eastwards to the Red Sea below Suakin, will roughly mark off the comparatively

NORTH ATLANTIC OCEAN
EUROPE
ASIA
AFRICA
SOUTH ATLANTIC OCEAN
INDIAN OCEAN
GERMANY
POLAND
ENGLAND
FRANCE
SPAIN
PORTUGAL
ITALY
GREECE
TURKEY
ANATOLIA
CZECHO SLOVAKIA
AUSTRIA
HUNGARY
ROMANIA
BULGARIA
YUGO-SLAVIA
RUSSIA
UKRAINE
KIRGHIZ
TURKISTAN
PERSIA
ARABIA
SYRIA
MESOPOTAMIA
Bay of Biscay
Mediterranean Sea
BLACK SEA
CASPIAN SEA
Aral Sea
Ust Urt
Azores
Madeira Is
Canary Is (Spain)
MOROCCO
ALGERIA
Algerian Sahara
LIBYA
Libyan Desert
EGYPT
Nubian Desert
NUBIA
ANGLO-EGYPTIAN SUDAN
SAHARA
Tropic of Cancer
Tropic of Capricorn
Equator
FRENCH WEST AFRICA
Niger Territory
FRENCH SUDAN
SENEGAL
GAMBIA
FRENCH GUINEA
SIERRA LEONA
LIBERIA
IVORY COAST
Grain Coast
GOLD COAST
ASHANTI
NORTHERN TERRITORIES
TOGOLAND
DAHOMEY
NIGERIA
BORNU
KANEMBU
WADAI
CHAD
BAGIRMI
DARFUR
KORDOFAN
UPPER VOLTA
GULF OF GUINEA
CAMEROONS
FRENCH MIDDLE CONGO
EQUATORIAL AFRICA
GABON
BELGIAN CONGO
UBANGI-SHARI
UGANDA
KENYA
ABYSSINIA
BRITISH SOMALILAND
ITALIAN SOMALILAND
GULF OF ADEN
ANGOLA
BENGUELLA
NORTHERN RHODESIA
Barotse Country
NYASSALAND
TANGANYIKA TERRITORY
PORTUGUESE EAST AFRICA
MOZAMBIQUE
SOUTHERN RHODESIA
BECHUANALAND PROTECTS
DAMARA LAND
SOUTH WEST AFRICA
NAMAQUA LAND
Great Kalahari Desert
TRANSVAAL
ORANGE FREE STATE
NATAL
Zulu Land
CAPE OF GOOD HOPE
MADAGASCAR
Reunion or Bourbon I.
Mauritius
St Helena
Ascension
Madeira
Canary
Cape Verde
Dakar
Freetown
Monrovia
Grain Coast
C. Palmas
Accra
Lagos
Calabar
Fernando Po
Gaboon R.
Libreville
Loanda
Benguella
Mossamedes
Walvis B.
Cape Frio
Cape Cross
Cape Town
Cape of Good Hope
Port Elizabeth
East London
Durban
Lourenco Marques
Beira
Quelimane
Mozambique
Zanzibar
Mombasa
Dar es Salaam
Kilwa Kiwinji
C. Delgado
Port Durnford
Nairobi
Victoria Nyanza
Lake Victoria
Albert Nyanza
Lake Albert
Lake Tanganyika
Lake Nyassa
Lake Bangweolo
Lake Mweru
Lake Tchad
Lake Rudolf
Lake Stefanie
Lake Chilwa
Lake Ngami
Victoria Falls
Kimberley
Pretoria
Johannesburg
Bloemfontein
Port Elizabeth
Durban
Delagoa Bay
Inhambane
Beira
Sofala
Zambesi R.
Congo R.
Niger R.
Nile R.
Orange R.
Limpopo R.
Zambesi R.
Red Sea
Suez Canal
Aden
Socotra
Madagascar
Comoro Is
Reunion
Mauritius
Tropic of Capricorn
Tropic of Cancer
Equator
Meridian of Greenwich
Longitude East of Greenwich
English Miles
Kilometres
Cape of Good Hope
Malmesbury
Cape Town
Simon's Town
Table Bay
Robben I.
Hondeklip B.
Olifant R.
Clanwilliam
St Helena B.
Saldanha B.
Langebaan Lagoon
Port Nolloth
Garies or Orange R.
Luderitz B.
Angra Pequena
Walvis B.
Swakop R.
Cape Frio
Cape Cross
Mossamedes
Pinda
Gr. Fish B.
Cunene R.
Benguella
Loanda
Ambriz
Congo R.
Cabinda
Landana
Chinchoxo
Banana
Boma
Matadi
Stanley Pool
Leopoldville
Brazzaville
Libreville
Gaboon R.
Corisco I.
Fernando Po
Calabar
Bonny
Brass
Benin
Lagos
Porto Novo
Whydah
Accra
Cape Coast
Elmina
Axim
Sherbro I.
Freetown
Port Loko
Rio Nunez
Rio Pongo
Conakry
Boffa
Boké
Benty
Rio Grande
Bissagos
Bolama
Geba R.
Gambia R.
Bathurst
St Louis
Senegal R.
Cape Verde
Dakar
Gorée
Rufisque
Joal
Portudal
Sangomar Pt
Saloum R.
Gambia R.
Casamance R.
Cacheu R.
Bissagos
Bolama
Geba R.

NORTH EUROPE
ATLANTIC OCEAN
Bay of Biscay
SPAIN
ITALY
MEDITERRANEAN SEA
BLACK SEA
ASIA
Aral Sea
CASPIAN SEA
Persian Gulf
Azores Is.
Madeira Is.
Canary Islands
Cape Verde
Tropic of Cancer
Tropic of Capricorn
SAHARA OR GREAT DESERT
Libyan Desert
Nubian Desert
Arabian Desert
ARABIA
Gidi or Igidi Desert
El Juf
Tasili Plateau
Algerian Sahara
Hammada el Hamra
The Tell
Algerian Plateaux
Atlas Mts
Tibesti
Tarso Mts
Borku
Adghagh Plateau
Air or Asben
Asawad
Timbuktu
Hombori Mts
Bandiagara
Fouta Jalon
Sierra Leone
Liberia
Ivory Coast
Gold Coast
Togoland
Dahomey
Benin
Nigeria
Cameroon
Fernando Po
Bight of Biafra
GULF OF GUINEA
Guinea Current
Equatorial Current
South Atlantic Current
Benguela Current
Mozambique Current
Agulhas Current
North African Current
Canary Current
Cape Current
Kano
Kadina
Sokoto R.
Niger R.
Chad
Bahr el Ghazal
Bahr el Ghabel
Bahr el Arab
Bahr el Jebel
Bahr el Zeraf
Bahr el Azrak
Bahr el Abiad
Khartoum
Omdurman
Dongola
Wadi Halfa
Suakin
Jeb. Mazia
El Obeid
El Fasher
Darfur
Kordofan
Nile R.
Blue Nile R.
White Nile R.
Atbara R.
Sobat R.
Gulf of Aden
Socotra I.
Guardafui
Ras Hafun
Ras Dashan
PLATEAU OF ABYSSINIA
Afar
Tana L.
Nogal Pt.
Berbera
Wady Nogal
REGION OF GREATEST HEAT
Lake Chad
Bodele
Kanem
Borku
Tibesti
Air
Asben
Adghagh
Tasili
Hoggar Mts
Tuat
Ghadames
Ghat
Fezzan
Tripoli
Gulf of Sidra
Barka Plateau
Algiers
Oran
Tunis
Sardinia
Corsica
Sicily
Malta
Crete
Cyprus
Rhodes
Adriatic Sea
Aegean Sea
Danube R.
Rhone R.
Loire R.
Paris
London
English Channel
Lands End
C. Finisterre
Strait of Gibraltar
Ceuta
Melilla
Balearic Is.
Marseilles
Genoa
Naples
Rome
Venice
Trieste
Athens
Alexandria
Cairo
Delta of the Nile
Isthmus of Suez
Suez
Gulf of Suez
Gulf of Aqaba
Arabian Desert
Libyan Desert
Oases of Kufra
Oases of Jofra
Oases of Fezzan
Oases of Ghat
Oases of Ghadames
Oases of Tuat
Oases of Tidikelt
Oases of Gurara
Oases of Touat
Oasis of Kawar
Oasis of Aujila
Oasis of Siwa
Oasis of Farafra
Oasis of Dakhla
Oasis of Kharga
Oasis of Baharia
Oasis of Siwa
Oasis of Bilma
Oasis of Ghat
Oasis of Ghadames
Oasis of Tuat
Oasis of Tidikelt
Oasis of Gurara
Oasis

low northern plain from the lofty southern plateau. This remarkably uniform disposition of the general continental relief is clearly established by the independent measurements of Denham and Clapperton, Barth, Vogel, Nachtigal, and Lenz for the northern, Speke, Burton, Livingstone, Stanley, and Anderson for the southern section. From these it appears that between Tripoli on the Mediterranean, and the Lake Tsad (Chad) depression in Central Sudan, or Soudan (850 feet), the mean for the Central Sahara ranges from 1300 to 1400 feet, falling in Sudan generally somewhat lower. Corresponding with these heights are those of Khartum at the confluence of both Niles in the east (1210), and Timbuktu at the great western bend of the Niger in the west (820). In the south, the plateau between the coast-region and Lake Tanganyika maintains a uniform elevation of about 4000 feet, with which may be compared Lake Dilolo, on the Upper Zambezi (4740); Linyanti, near the eastern bend of the same river (3500); Lake Ngami (2700); the Kalahari Desert (3900); Bushman Flat, south of the Orange River (3600). The rapid descent from the plateau to the northern plain is well marked towards the east of the continent by the Somerset (Victoria) Nile, which in the short course of 90 miles between the Victoria and Albert Nyanzas, falls from 3700 feet, the level of the upper, to 2000 feet, the level of the lower lake, no less than 1700 feet altogether.

Orography.—The southern plateau is intersected by several mountain-ranges, as yet very imperfectly explored, but apparently nowhere developing any vast orographic system. Such are the Lokinga (Mushinga) Mountains, running east and west, and forming a distinct divide between the head-waters of the Lualaba (Congo) and the streams flowing south to the Zambesi. Farther north, another important water-parting between the Congo and Nile basins is formed by the Ulegga Range, and its southern extension along the west side of the Edward and Albert Nyanzas. The mountain mass of Ruwenzori, discovered by Stanley in 1888, lies just north of the equator, between the Edward and Albert Nyanzas, and its highest peak is estimated to be 16,600 feet high. East of the Victoria Nyanza rise Kilima-Njaro (19,300) in what was till 1919 German, and Kenia (17,000) in British, East Africa. The Aberdare Range (13,000) runs south and north between Kenia and Lake Naivasha in the direction of Lake Baringo, long supposed to be one of the great equatorial lakes, but found by Thomson to be a small land-locked basin, 3217 feet above sea-level, commanded on the NW. by Mounts Chibcharagnani (12,000) and Elgon (14,000). This region, where the mountains follow the lines of the western and eastern rift valleys (see the article RIFT VALLEY), in which most of the great lakes lie, has active volcanoes in Mfumbiro, Teleki, &c. It seems to merge through the Kaffa Hills northwards in the Abyssinian uplands (10,000 to 15,000), which form the north-eastern limit of the great southern plateau. From this point the outer continental rim or coast-range stretches almost continuously through Galla Land, and along the east side of Lake Nyasa, southwards to the Nieuweveld system (8000 to 10,000) at the southern extremity of Africa. These eastern coast-ranges, spoken of by the early Portuguese explorers under the collective name of *Lupata*, may in some respects be regarded as forming, if not a backbone, at least the border-chain of one great continental highland system. The corresponding west coast-ranges are both much lower and less continuous, being interrupted by wide gaps in Damaraland, and especially on the NW. coast between the Senegal River and Morocco. They culminate in the Cameroons (13,400), at the head of the Gulf of Guinea, and in the heights formerly known as the 'Kong' Mountains of Upper Guinea often present the appearance rather of outer scarps than of ranges actually rising above the inner tablelands.

The Atlas system (8000 to 12,000), stretching in the extreme NW. between Cape Nun, over against the Canaries, and Cape Bon, over against Sicily, runs parallel to the Sierra Nevada on the opposite coast, with which it forms a distinct physical region. Sallust's remark that this part of Africa belonged physically to Europe, has been amply confirmed by modern research, which clearly shows that even in Pliocene times, Mauritania was still connected with Iberia at the Strait of Gibraltar, and with Italy through a north-eastern continuation of the Atlas, of which Pantellaria, Malta, Gozzo, Sicily, and the Lipari group are surviving fragments, while the Balkan Peninsula merged southwards in the now flooded plains formerly frequented by elephants, hippopotami, and other large fauna. At that time the Mediterranean seems to have formed three distinct basins, with a common outlet to the Atlantic not north of the Atlas, as now, but south of that range, through the depression still marked by the Kebir and Melghir sebkhas, and the valley of the river Draa. To this extent the Saharian region may have been flooded by marine waters; but that it ever, since Eocene times at least, formed an oceanic bed, as is still often maintained, is an assumption that has been completely refuted by the measurements and geological researches of Oscar Lenz and other recent observers. We now know that the Sahara is a vast elevated plain, somewhat higher than the Sudan (see above), and that it consisted of well-watered and fertile lands, obliquely intersected by a great divide (the Tibesti highlands), whence flowed mighty streams, such as the Igharghar north to the Mediterranean, the Messawara south to the Niger, and others east to the Nile. In some of the pools lying along the sandy beds of these rivers, the crocodile still survives, while the elephant, as well as the camel, formed part of the Mauritanian fauna within the historic period. In fact, the Sahara was what the Sudan still is—a thickly peopled land, abounding in natural products, diversified with broad belts of tropical forests, arable tracts, and grassy steppes, according to the nature of the soil, and greater or less abundance of moisture. This is also the general character of the great southern tableland, which, like the northern plain, has also in the Kalahari its desert zone, both zones corresponding to similar arid regions, such as the Gobi, the Turkestan, Persian, and Arabian sands, the salt plains of Utah, the Australian and Bolivian wastes, all somewhat symmetrically disposed on either side of the equator, and due to cosmic or atmospheric causes, which have not yet been clearly elucidated.

In its *geological* constitution, Africa presents the appearance of great stability and antiquity. Unlike those of other continents, the seaboard is subject to scarcely any movements of upheaval or subsidence, except on the NE. coast between the Nile delta and the Gulf of Sidra (an area of subsidence), and parts of the Moroccan and Red Sea coasts (areas of upheaval). Earthquakes are confined mainly to the Atlas, which belongs physically rather to Europe than to Africa, and igneous disturbances are restricted on the west side to the Bight of Biafra (the Cameroons, Fernando Po, and other adjacent islets). But on the east side, the volcanic system is much more highly developed, stretching from the Comoro Islands through Masai Land (Kilima-Njaro, Kenia, Elgon, &c.), northwards to the Danákil country, and the volcanic islets in the Red Sea. The lava-fields of

the Masai plateau appear to be the most extensive on the continent, and at many points present signs of recent activity. But elsewhere the old plutonic prevail immensely over the more recent eruptive rocks, just as the older sedimentary do over the later tertiary and quaternary formations. Both orders appear to be generally intermingled, and largely associated with semi-crystalline and metamorphic forms, such as the schists, gneisses, graywackes, and hornblendes, about Kilima-Njaro and many other places. The Kamasia Range (8000 to 9000), NE. of Victoria Nyanza, is essentially metamorphic (white striated felspar, quartz, and black mica), while shales and flaggy sandstones form the geological basis of the East African carboniferous series, which extends in a narrow strip from near the equator continuously to the Cape. Hard granite forms the bed of the Orange River, and asbestos, soapstone, coal, iron, and copper were amongst the specimens collected by Farini in the Kalahari steppe. Metamorphic rocks, again, prevail in the Congo basin, where iron and copper ores also abound, and where plutonic systems succeed above Stanley Pool (Johnston). Syenite, and other granites, with old sandstones, are the characteristic features of Upper Egypt and the Nubian steppe; while Abyssinia has also a granitic base underlying dolerites, trachytes, and crystalline slates. But here the eastern slopes, skirted or traversed by the great volcanic zone, are strewn with obsidian, pumice, and other recent lavas.

A great diluvial plain stretches from this region through Senaar southwards to the crystalline slates, associated with magnetic iron ores of the Baginze slopes, about the source of the Welle. Even the Sahara, long supposed to be a recent marine basin, is characterised by the absence of late sedimentary rocks and marine fossils, and by the prevalence of old sandstones, quartz, and carboniferous limestones, largely disintegrated by weathering. It also abounds in rich saline deposits, forming a chief article of trade with the neighbouring Sudan, which is distinguished by the almost total absence of salt, the prevailing formations here being crystalline rocks, granites, diorites, slates, gneiss, again associated with sandstones in the higher ranges. In the Guinea uplands the sandstones overlie the granites, which in the Teggele group (Kordofan) pass over to porphyries and syenites, with gneiss interspersed with extensive diorite and auriferous quartz veins. Gold, mined by the ancient Egyptians at Mount Elba, Red Sea coast, occurs also in many other places, as in Upper Guinea, the Lower Zambesi, and Transvaal; and gold dust has at all times formed a chief article of export. But iron and copper are the characteristic metals, ferruginous ores abounding almost everywhere, and copper in Namaqualand, the Congo basin, Dar-Fertit, and many other places. The basin of the Vaal is one of the richest diamantiferous regions on the globe. In this southern region, granites and crystalline slates form the substratum of an extensive series of fossiliferous rocks, descending from the outer rim (Nieuweveld) down to the coast in a series of terraces ('karroos'), which are baked clay in the dry season, but flowery and grassy meads in the wet season.

The African *hydrographic* are drawn in bolder lines than its orographic systems. Here also a certain symmetry prevails, the two great southern basins of the Congo and Zambezi balancing those of the Nile and Niger of the northern plain, while the secondary Orange and Limpopo in the extreme south find their counterparts in the Senegal and Draa of the NW. The Zambezi and Limpopo, together with the Rovuma, Juba, and a few other coast streams, flow to the Indian Ocean; all the others, together with the Cunene, Koanza, Ogowe, Volta, Gambia, Tensift, Muluya, and Mejerdah, to the Atlantic, either directly or through the Mediterranean. Nearly all are still entangled in the intricacies of the interior, hence are obstructed either along their middle or lower courses by formidable falls and rapids, such as the stupendous Victoria Falls on the Zambezi; the Yellala and Isangila on the Lower, and Stanley on the Middle Congo; the so-called 'Six Cataracts,' the Ripon, Murchison, and many others, all along the Nile above Egypt; the Aughrabies Falls of the Middle Orange. Freest from these impediments are both the Niger and its great eastern affluent the Benue, which latter affords a clear navigable highway into the very heart of Sudan. Here a scarcely perceptible divide, with a continuous waterway in very wet seasons, separates the Benue from the Shari, which gives further access by water northwards to Lake Tsad, south-eastwards towards the Nile and Congo basins. In this region, the Shari, with its numerous head-streams, approaches the Makua-Welle, which its discoverer, Schweinfurth, supposed to flow from the Monbuttu uplands NW. to the Tsad, but which was shown by the later explorations of Grenfell, Lupton, and Junker to pass SW. through the Ubangi to the Congo basin. For other points once doubtful, such as the course of the Ogowe, Alima, Sankuru, the drainage of Lake Leopold, &c., mostly cleared up in comparatively recent years, see below under History of African Exploration.

But apart from its great rivers, including its historical Nile, earliest seat of human culture, Africa possesses a magnificent equatorial lake system, elsewhere unrivalled except by the great North American lacustrine basins. These are the crowning glory of modern African research, all having been revealed to science by English-speaking explorers (Livingstone, Speke, Grant, Burton, Baker, Stanley) since the middle of the 19th century. They are grouped towards the east side of the continent between 15° S. and 5° N. lat., and all stand on the southern tableland, draining seaward through the Zambezi (Nyasa, with outflow Shiré, now failing), the Congo (Kivu, Tanganyika, with intermittent outflow Lukuga), and the Nile (Victoria, Edward, and Albert, with outflow Somerset Nile). Victoria, queen of African lakes, is next to Superior (31,200 sq. m.), the largest fresh-water basin (26,000 sq. m.) on the globe. The Shimiyu, an influent from the south, may be regarded as the farthest head-stream of the Nile, which thus rises about 3° S. lat., flowing thence northwards to the Mediterranean for some 3700 miles—a course accordingly next in length to that of the Missouri-Mississippi, the longest river in the world. The Kagera, however, which enters Lake Victoria from the west, has a better claim to be reckoned the uppermost section of the Nile. Albert Nyanza and Mwutan Nzigé were long taken as alternative names of a continuous sheet of water since ascertained to form two distinct lakes. The northern, now known as Lake Albert, is a kind of backwater of the Nile; and the southern, named by Stanley (who visited it in 1876 and 1889) Albert Edward Nyanza, and now known as Lake Edward, discharges into the northern one by the Semliki River. In 1887 Emin Pasha reported his conviction that Lake Albert is silting up. The outflow of Tanganyika was also a somewhat doubtful point, until the surveys of Thomson, Hore, and Wissman made it quite certain that it drains westward through the Lukuga, at least intermittently, to the Congo. This adds considerably to the drainage area of the Congo, which ranks next to the Amazon for volume, discharging probably as much water as all the other African rivers together (Reclus). Since Stanley's identification

of the Lualaba with the Congo, its furthest head-stream appears to be the Chambezi, an eastern feeder of Lake Bangweulu, rising in 10° S. lat., 33° E. long., and giving to the Congo system a total length of considerably over 3000 miles.

The equatorial lake system is thus distributed among the three great fluvial basins of the Zambezi, Nile, and Congo, apart from such inland basins as that of Lake Rudolf. Scattered over the continent are several other lacustrine basins, varying greatly in size, which have no seaward outflow, but form independent, or, at all events, now isolated centres of inland drainage. By far the most extensive is that of Lake Tsad (Chad), fed by the Shari and Komadugu. There is good reason to believe that it once discharged to the Benue (as it still does in exceptional seasons). The lake is now dwindling. So is Lake Ngami in Bechuanaland. The area of inland drainage in Africa is calculated at about 3,400,000 sq. m., or nearly a third of the continent. Alpine lakes are represented by the Abyssinian Lake Tana (Tsana or Dembea, 6100 feet), which has an area of some 1200 sq. m., and a depth of over 300 feet. It is fed by numerous alpine streams, amongst which is the Abai, farthest source of the Bahr-el-Azraq, or Blue Nile, which, after sweeping round the Abyssinian plateau, joins the Bahr-el-Abiad, or White Nile, at Khartum. Before the discovery of the great lakes, Tana was considered by many geographers as the chief reservoir and farthest source of the main stream. The great hydrographic systems may now be tabulated thus:

Seaward Basins—	Area in sq. m.
Nile	1,500,000
Congo	1,350,000
Niger	1,150,000
Zambezi	850,000
Orange	400,000
Limpopo	200,000
Senegal	160,000
Ogowe	150,000
Smaller basins and dried-up areas of seaward drainage	1,620,000
Total seaward	7,380,000
Inland Basins—	
Tsad	750,000
Ngami	320,000
Igharghar, Messawara, and other dried-up areas of inland drainage	2,330,000
Total inland	3,400,000

Climate.—Above all the great divisions of the globe, Africa is distinguished by the general uniformity of its climatic phenomena, a circumstance due to its massive form and intertropical position. In the region approaching nearest to the northern or southern equinoctial lines, rain falls throughout the year, thanks to the opposing trade-winds, which, by neutralising each other, often preserve the stillness of the atmosphere, and enable the local vapours to condense and precipitate themselves on the spot. In the northern hemisphere, a zone of two wet seasons stretches from the equator to the 15° lat. In summer, copious showers are caused by the moisture-bearing SW. winds; in winter, the NW. currents become in their turn the bearers of heavy rain-charged clouds to the southern plateau. But on both sides of the torrid zone, comprising about seven-tenths of the whole continent, the difference in the disposition of the winds causes a corresponding contrast in the rainfall. Here the trade-winds maintain their normal direction constantly, or with but slight temporary deviations. Blowing from the NE. in the northern, from the SE. in the southern hemisphere, they divert to the equator most of the vapours crossing their path, leaving elsewhere clear skies and arid lands. Thus it happens that Africa has two almost completely barren zones of rocks, gravels, marls, clay, and sand—the Sahara and Libyan desert in the north, Kalahari and other wastes in the south. This regular disposition of the climates is completed by the regular alternation of winds and rains in the zones of Mauritania and the Cape, both belonging to the region of sub-tropical rains, which fall in the respective winters of each hemisphere. Africa is thus disposed from north to south in successive gray and more or less intensely green belts, whose limits coincide in several places with the isothermals, or lines of equal temperature. The lines indicating mean annual temperatures of 68° and 75° F., traverse, in the north, the Mediterranean seaboard and the Sahara respectively; in the south, the Orange basin and a zone stretching obliquely from Mozambique to the Cameroons; while the area of greatest mean heat (82° F.) is comprised within an irregular curve inclosing the Upper Nile basin between Khartum and the Albert Nyanza north and south, Lake Tsad and Massowah (Massawah) west and east. But, through defective or incomplete observations, the general temperature has often been exaggerated; that of Gambia, for instance, has been reduced by the Colonial Official Report for 1886 to about 70° F. for January, and 80° to 82° for July *at noon*. Nevertheless, owing to the far greater accompanying moisture, these relatively moderate heats are far more oppressive than those of the Beluchistan coast and other drier regions, where the glass constantly rises to 115°, and even 120° F. and 125° F. For the same reason the climate, except on the Mediterranean, Saharian, Red Sea, and extreme south coasts, is nearly everywhere malarious round the periphery of the continent—that is, on the low-lying and generally marshy coast-lands between the outer rim and the sea. It is the same in the Chambeze, Malagarazi (Unyamwesi), Shari, and other inland districts, which are either constantly or periodically under water. But elsewhere, with due precautions, the continent cannot be regarded as insalubrious; and the Sahara, for instance, is distinctly a healthy region, although, owing to rapid radiation, the hot days are here succeeded by cool and occasionally even frosty nights. The mean annual rainfall ranges from under four inches in the Sahara and about ten in the Kalahari, to sixty and eighty about the equator, and from eighty upwards on the Guinea coast. Under all these conditions, Schweinfurth, for many years a resident in Africa, considered European colonisation of most of this continent a possible future contingency.

Flora.—About 41 per cent. of the surface is said to be either desert, or under scrub, or otherwise absolutely waste, and 35 per cent. steppe, or nearly treeless grass-grown savannah, leaving only 24 per cent. for forest and arable lands. But too much weight cannot yet be attached to such broad statements as these, and all that can be concluded from a comparison of recent observations is, that the grassy tracts appear to be far more and the woodlands far less extensive than had been supposed. The continuous forest growths are now known to be confined mainly to the vast equatorial region between the Upper Zambezi and Sudan, and to some isolated tracts about the Abyssinian plateau, in the Moroccan Atlas, all along the Guinea coast, about the Middle Limpopo and Zambezi, and in parts of Masai Land and the Upper Nile basin. 'From Sierra Leone to the river Ogoway, along the coast, the one prevailing landscape is that of endless forest. This is, in fact, part of the forest region—the forest belt, which has a distinctive fauna and flora, and which extends eastwards, near the equator, more than half-way across

Africa to Lake Victoria Nyanza and the western shores of Tanganyika' (H. H. Johnston, *The River Congo*, p. 13).

In the extreme north, African and South European species intermingle with some local varieties, and here are found the olive, date, and cork, with seven other kinds of oak, besides the eucalyptus, lately introduced from Australia, all flourishing side by side. Nevertheless, the graminaceæ are predominant, and vast tracts in Algeria and Tunis are covered with halfa (alfa), largely exported to England for paper-making. The papyrus itself, whence the word paper, still lingers in the Upper Nile, although in the Lower Nile the lotus and other characteristic plants have been mostly replaced by cereals, cotton, tobacco, and other economic species. Beyond Egypt, the date gives place to the dúm and deleb palms, wheat and rice to durrha; while in the forest regions of Sudan and Guinea, the prevailing species are the magnificent baobab (Adansonia), the banana, butter-tree, ebony, *Elœis guineensis* or oil-palm, which yields the palm-oil of commerce, the musanga, the mangrove, ground-nut, dragon-tree, acacias, mimosas, and other gum-trees, succeeded, in Galla and Somáli Land, by aromatic shrubs and the coffee shrub, supposed to take its name from the Kaffa country, south of Abyssinia. Another variety of this shrub is indigenous in Liberia, whence it has lately been introduced into Ceylon and other coffee-growing lands. Indigenous to Africa is also the cotton-plant, which, like indigo, is widely cultivated in Egypt and Sudan, and which grows wild in many places as far north as 19° N. lat. But of all African floras, the most characteristic, as well as the richest and most diversified, is that of the Cape region south from the Orange River. It consists chiefly of grasses, shrubs, bushes, and lovely ferns, and heathers in greater variety than is found even in the richest European lands. Here, one might fancy, had been gathered, as in a last refuge, the diverse growths of the vanished 'Lemurian' continent, which is by some geologists supposed to have occupied the Indian Ocean down to the close of Miocene times. This supposition is strengthened by the character of the Madagascar flora, which possesses over forty genera peculiar to itself.

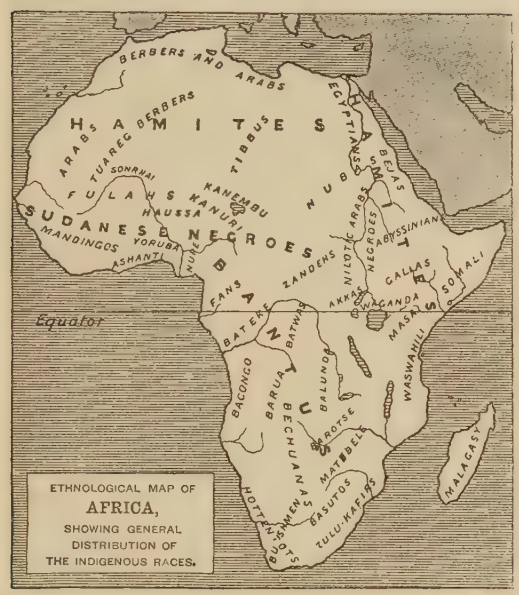
Fauna.—Africa is the peculiar home of the large fauna, many of which, owing to the absence of great central mountain barriers, freely roam from one end of the continent to the other, without undergoing any special modification of type. Such, among the carnivora, are the lion, far finer than its Asiatic congener, and met everywhere, from the Atlas and Nubia to the Cape; the panther and leopard, but not the tiger; the hyena, fox, and jackal. The great herbivora are represented by the elephant, differing both from the Asiatic and from the smaller and now extinct Mauritanian variety; the rhinoceros, of which there appear to be at least three species, including the one-horned, now known to occur in Nubia, and perhaps also in Wadai; the buffalo, also in several varieties; the giraffe, elsewhere extinct, but here still ranging from north to south, a remark applicable also to the ostrich, as well as to the unwieldy hippopotamus, which, like the crocodile, frequents all the large rivers and lakes. Africa is also the special home of the gnu, and of several other species of antelopes, sometimes still met in countless herds on both sides of the equator. The monkey family is also spread over the whole continent, where it is represented by numerous types, including the small Barbary variety, the dog-faced baboon, the Galago lemur, the beautiful colobus of the eastern regions, besides the anthropoid chimpanzees and gorilla of the west equatorial districts. Peculiar also are such equidæ as the zebras and the pigmy Mauritanian ass; although the horse itself, like the camel, appears to have been reintroduced by the Arabs. Of land mammals there are altogether enumerated about 480 species peculiar to this continent, amongst which are 95 of the simian and 50 of the antelope family.

Equally distinct is the avi-fauna, which, besides the ostrich, includes the secretary, ibis, guinea-fowl, weaver-bird, roller-bird, love-bird, waxbill, whydah, sun-bird, parrots, quail, and several other indigenous species. Reptiles and insects also abound, comprising the huge python, many poisonous snakes, termites, locusts, and two little winged pests highly destructive to domestic animals—the tsetse fly, which ranges from Mozambique to Senaar, fatal to the horse, camel, ox, and dog; and the donderobo, south of Kilima-Njaro, which attacks the ass, goat, and sheep. The tsetse especially is one of the great impediments to the progress of culture, although it is said to disappear as systematic cultivation of the soil is developed.

Inhabitants.—Recent authorities roughly estimate the population of Africa at 140,000,000 to 210,000,000, giving a density very much less than that of Europe, but still considerable, regard being had to the great extent of absolutely desert, forest, and other waste lands. According to the nature of soil and climate, the population is distributed very unevenly over the surface, being massed somewhat densely in the Nile delta, in the Upper Nile Valley, and generally throughout Sudan, less thickly over the southern plateau, and very thinly in Mauritania and Tripolitana; while large tracts, especially in the Western Sahara, the Libyan and Kalahari wastes, are absolutely uninhabited. Of the whole number, probably less than 3,000,000 are recent immigrants from Europe, settled chiefly in the extreme north (Egypt and Algeria) and in the extreme south (the Cape Province, Natal, and the Transvaal). About 34,000,000, all of *Semitic* stock, are intruders from Asia, some in remote or prehistoric times (3,000,000 Himyarites in Abyssinia and Harar from South Arabia), some since the spread of Islam (over 30,000,000 nomad and other Arabs, chiefly along the Mediterranean seaboard, in West Sahara, and Central and East Sudan). All the rest, numbering 100,000,000 to 175,000,000, may be regarded as the true aboriginal element. These are classed by Lepsius in two great physical and linguistic groups: *Hamites* in the north, *Negroes* in the south, meeting and intermingling in the intermediate region of Sudan. But this broad grouping is inadequate to explain the present conditions, for there are probably more than two indigenous stock races, and certainly more than two stock languages in Africa, while the races themselves are intermingled in the southern plateau quite as much as, if not even to a greater extent than in Sudan. The Arabic term, Beled-es-Sudan, 'Land of the Blacks,' answers to our somewhat obsolete expressions *Nigritia*, *Negroland*, which is commonly regarded as the true home of the black race. Certainly more ideal Negro peoples—that is, ideal in their departure from the European standard—are found in Upper Guinea, for instance, and among the Bari and Shilluk Nilotic tribes, than amongst the Bantus, as the Negro or Negroid peoples of the southern plateau are now collectively called. In general, it may be said that, viewed as a whole, the Negro family presents as profound deviations within itself as do the Caucasic and the Mongolic—that is, the two other great families of the eastern hemisphere. The deviations are even greater, if in the typical Negro group are to be included not only the aberrant Hottentots of the extreme SW., but also the pigmy peoples, such as

the Bushmen of the Kalahari steppe, the Obongos of the Gabun, the Akkas south of Monbuttuland, and the diminutive Batwas, averaging only 4 feet 3 inches in height, discovered in 1886 by Dr Ludwig Wolf in the Sankuru (Middle Congo) basin. These western Negritos, scattered over the southern tableland, seem to stand in the same relation to their taller neighbours as the eastern Negritos (Andamanese, Malayan Samangs, Philippine Aetas, the now extinct Kalangs of Java) to their taller Papuan neighbours; whilst their languages, such as that of the Bushmen, abounding in, to us, unpronounceable sounds known as 'clicks,' are said by some to form a sort of connecting link between articulate and inarticulate speech.

Radically distinct from these idioms is the Hottentot, which itself differs fundamentally from the Bantu, a vast linguistic family, current amongst nearly all the other peoples of the plateau, from the Ama-Khosas of Kafirland northwards to the Wa-Gandas of the Somerset Nile and the Duallas



of the Cameroons. This wonderful Bantu group, comparable in extent as well as in complexity of structure to the Aryan, Finno-Tatar, Athabascan, and other widespread families in the other continents, gives a certain unity to the Bantu populations, who could not otherwise be distinguished by any hard and fast line from their northern Negro and Negroid neighbours in Sudan. Here the diversity of speech is as great as is the diversity of types produced by immemorial interminglings with the conterminous Hamite peoples. But amid the general chaos of tongues awaiting future classification, certain relatively large linguistic groups have already been determined, and these have so far helped to diminish the prevailing confusion. Such are the *Mandingan*, with many branches, in Senegambia; the *Sonrhai* of Timbuktu and the middle Niger; the *Fulah* and the *Hausa*, both widely diffused throughout Western Sudan; the *Tibbu* (*Tedaga* and *Dasaga*), ramifying from South Fezzan across the Central Sahara to Kanem, Bornu (Kanúri), Wanyanga and Dar-Fur (Baele and Zoghawa); lastly, the *Nuba* of Kordofan and the Middle Nile above the Egyptian frontier. The Nubas, once supposed to be related to the Fulahs, are now known to be true Negroes, whose type is preserved in Kordofan, and greatly modified in the Nile Valley (Keane). For some further details as to the relationships of the various Hamitic, Negro, Negroid, and mixed stocks inhabiting these regions, the article ETHNOLOGY in this work should also be consulted. The researches of Nachtigal also helped to determine the hitherto doubtful position of the Tibbus (the Garamantes of the ancients), who occupy the whole of Eastern Sahara, from about 12° E. long., and whose true home appears to be the Tibesti highlands. Physically they are not to be distinguished from their Tuareg (Hamite) neighbours; but the race has been gradually displaced southwards to the Tsad basin, where their speech, fundamentally distinct from the Hamitic, has been adopted with considerable modifications by the Kanuri, Kanembu, and other true Negro peoples. Other large Negro groups are the Batta of Adamáwa; the Nupe and Yoruba of the Lower Niger; the Mosgu (Masa), south of Lake Tsad; the Maba of Wadai, the Dinka, Shilluk, Bari, and Monbuttu of the Upper Nile and Upper Welle; lastly, the Zandeh (Nyam-Nyam) and Fan, occupying most of the comparatively lately explored region between Sudan and the Congo and Ogowe basins. All of these appear to be true Negroes, except the Fans, who have in recent times reached the west coast about the equator, and who are described as quite distinct (Hamites?) from the surrounding black populations (Burton, Lenz).

The remainder of North Africa, except where encroached upon by the intruding Semites (see above), is the proper domain of the Hamites—that is, the African branch of the Caucasic family. Their physical type is essentially Mediterranean, often characterised by extremely regular features, and in places even by blue eyes and fair complexion (Aures uplands, Algeria). But their language bears no distinct relation to any other Caucasic form of speech, beyond a certain faint resemblance to the Semitic sufficient to suggest a possible primeval Semitico-Hamitic organic tongue. It has a geographical range in the north analogous to that of the Bantu in the south, being spoken with great dialectic diversity by the Berbers (Imoshagh) in Western Sahara (Tuaregs), and Mauritania (Shluhs, Kabyles, Mzabs), and in the east by the Gallas, Somális, Masai (?), Afars (Danákil), Agau, and Bejas—that is, generally between the Nile basin and the Red Sea. But it is now extinct in Egypt, where Arabic is current, and where the old Hamitic speech is represented only by the liturgical language of the few surviving Christian Coptic communities.

In its inhabitants, as well as its natural history, Madagascar forms a region apart, the dominant Hovas of the central plateau, the Sakalavas of the west, and the Betsimisarakas of the east coast, being either of pure or mixed Malay stock. The Malagasy language also, which is spoken with a certain uniformity all over the island, is an outlying branch of the great oceanic (Malayo-Polynesian) family, which stretches thence eastwards to Easter Island. Nevertheless, there is evidently a considerable intermixture of black blood, due to the importation of slaves from the Mozambique coast, and possibly also to the presence of a Negro element in the island before the arrival of the Malayan intruders in Madagascar.

The foregoing remarks will be rendered more intelligible by the subjoined general scheme of all the African races:

I.—NEGRO AND NEGROID PEOPLES.

NEGRITOS (Pygmies)—	
Bushmen (San)	Kalahari Desert.
Batwas	Sankuru River, Congo Basin.
Obongos	Ogowe Basin.
Akkas	South Monbuttuland.

NEGRO AND NEGROID PEOPLES—*continued.*

HOTTENTOTS (Khoi-Khoin)—
Namaqua.....Great and Little Namaqualand.
Koraqua.....Upper Orange, Vaal, and Modder rivers.
Griqua (half-castes).....Griqualand West.

BANTUS—
Zulu-Kafirs, Basutos, Bechuanas.....South from the Limpopo.
Makua, Matebele.....Between Limpopo and Zambezi.
Manganja, Waiyau.....Lake Nyasa.
Barotse, Barua, Balunda.....Between Zambezi and Congo.
Waswahili, Wanika, Wapokomo.....East Coast.
Waganda, Wanyamwesi, Walegga.....Equatorial Lakes.
Ovaherero, Ovampo, Bacongo, Bateke, Duallo.....West Coast.

SUDANESE NEGROES—
Kru, Fanti, Ashanti, Yoruba, Nupe.....Upper Guinea.
Mandingan, Wolof, Bambara, Sonrhai.....Senegambia.
Hausa, Batta, Kanuri, Baghirmi, Mosgu, Kanem.....Central Sudan.
Maba, Nuba, Dinka, Shilluk, Bari, Monbuttu, Zandeh.....Eastern Sudan.

II.—HAMITIC PEOPLES.

MIXED AND DOUBTFUL HAMITES—
Fans.....Ogowe Basin, thence inland.
Fulahs.....West and Central Sudan.
Tibbus.....East Sahara.
Agaus.....Abyssinia.
Masai.....Masailand.
Fellahin.....Egypt.

TRUE HAMITES—
Berbers—*Shluh*.....Morocco
Mzab, Kabyle.....Algeria, Tunis.
Tuareg.....West Sahara.
Gallas, Somáli, Afar (Danákil), Bejas.....North-east Coast.

III.—SEMITIC PEOPLES.

Arabs.....Mauritania, West Sahara, Central and West Sudan.
Himyarites (Amhara, Tigré, Shoa).....Abyssinia.

Religion and Social Condition.—Speaking generally, the northern Hamites and Semites are Mohammedans and stock-breeders, the southern Bantus nature-worshippers and agriculturists; all these factors intermingling in the intervening zone of Sudan. The chief exceptions to this broad statement are the Christian Abyssinians (Monophysite sect); the Hottentots, who are mainly cattle-breeders; and the Algerian Berbers, who prefer tillage to pasturage. A nomad existence prevails in East Sudan; a settled, in Central and West Sudan. Throughout the whole of this region Islam continues to encroach on heathendom; it is now firmly seated on the Upper Niger and Upper Senegal; it has already penetrated to various points of the Senegambian and Guinea coasts; it has spread with the conquering Fulahs to the southern limits of Adamáwa, and has crept down the east coast from Somáliland to Zanzibar and Mozambique. Thus fully one half of the continent has accepted its tenets, which have on the whole had a beneficent influence on the Negro peoples, by developing a taste for clothing and other social comforts, by suppressing cannibalism, and shaking their faith in the medicine man. Elsewhere, progress is barred by the all-prevailing fetishism, intimately associated as that system is with the baneful practice of witchcraft. Cannibalism also in its most repulsive forms holds its ground among the Monbuttus, Zandehs, and Fans, a central zone of anthropophagy apparently traversing the continent from the west coast along the equator nearly to the great lakes, and stretching northwards to the Upper Shari basin. On the other hand, slavery, while maintained by Mohammedanism as a necessary social institution, has, by the intervention of the European powers, almost ceased to be an object of foreign traffic. The horrors of the 'middle passage' no longer vex the conscience of Christendom, and the Arab slaver has nearly disappeared from the Red Sea and Indian waters. Christianity is progressing amongst Basutos and other Southern Bantus, and throughout Uganda.

The *political* map of Africa in the end of the 19th century and beginning of the 20th underwent prodigious modifications, the progress of exploration and mutual jealousy having stirred European nations to further appropriations in this continent; so that now, save Liberia, Abyssinia, and Egypt, the whole of Africa is under the direct or indirect control of European states—Great Britain, France, Portugal, Spain, Belgium, and Italy.

The British Empire includes in Africa some 2,500,000 sq. m.—a fifth of the British Empire scattered over the globe, and about twenty times the area of the motherland, Great Britain and Ireland. If to this we add 1,400,000 sq. m. for the virtual protectorate of Egyptian Sudan and mandatory territories, we get a grand total of 3,900,000 sq. m. In this are reckoned the crown colonies of Gambia and Sierra Leone (with a protectorate), on the Senegambian coast; Gold Coast Colony, with a coast-line of 350 miles along the Gulf of Guinea, and a protectorate including the Ashanti *hinterland;* and Lagos, on the Bight of Benin, now united with Nigeria. Nigeria is an enormous territory, including the whole of the lower basin of the Niger, and extending to Lake Tsad (Chad) on the north-east. In Nigeria is included Sokoto, late capital of the Fulah Empire. Walvisch Bay, on the coast of South-west Africa, is also British, and is a part of the Cape Province. The Union of South Africa, as constituted by the South Africa Act of the Imperial Parliament in 1909, includes the Cape of Good Hope, Natal, Orange Free State, and Transvaal Provinces, with which are associated Swaziland, Basutoland, Bechuanaland, and Rhodesia, though these are not within the Union. Nyasaland, formerly the British Central African Protectorate, Zanzibar, Uganda, and British Somaliland are protectorates, Kenya a colony and protectorate, in Central and East Africa. Already in British occupation, Egypt, which was officially still part of the Turkish Empire, became in 1914 a British protectorate. Its independence was acknowledged in 1922. After the Mahdi's rebellion, Dar-Fur, Kordofan, Senaar, Khartum, other parts of Nubia, and the Equatorial Province reverted to a barbarous independence; but since the Sudan campaign in 1898 these provinces have been administered jointly by Egypt and Britain as the Egyptian Sudan, under a convention signed in 1899. Mauritius, Socotra, and other islands are also British.

France occupies or has influence over about a third of the whole area of Africa; her African domain may be estimated to cover 4,000,000 to 4,500,000 sq. m., extending from the Mediterranean to the Congo River, and from the west coast to the watershed between the basin of the Congo and that of the Nile. It includes Algeria, with a protectorate over Tunis and most of Morocco; Maurétanie, Senegal, French Guinea, the Ivory Coast, between Liberia and Gold Coast Colony; Dahomey, between Togoland and Nigeria; with the enormous *hinterlands* of French Sudan and Sahara, which are, by the Anglo-French agreement of 1899, strictly delimited from the Egyptian Sudan and Sahara. Wadai, a powerful sultanate between Dar-Fur and Lake Tsad, on which the neighbouring kingdom of Baghirmi was dependent, was occupied by France in 1906. Gando is partly French, and some smaller states on the Niger. But Tibesti and several other districts in the Eastern Sahara are still practically independent. French Equatorial Africa (French Congo) extends from the coast along the north bank of the Congo and Ubangi rivers, and cut into by cessions to Germany in 1911, which reverted in 1919, joins French Sudan in the north. On the east coast is the French Somaliland Protectorate (Côte des Somalis), including the old colony of Obok; and the vast island of Madagascar is French, with the Réunion and Comoro Islands.

Portugal holds, on the west coast, her old possessions of Angola and Benguela, with a small tract just north of the Congo mouth (collectively form-

ing Portuguese West Africa), a small part of Guinea, Madeira (reckoned a part of Portugal), and St Thomas and Prince's Islands, and Cape Verde Islands; and on the east, Mozambique, with dependencies between Cape Delgado and Delagoa Bay, and along the Zambesi, past Tete, to Zumbo (Portuguese East Africa). Spain has possessions or protectorates (some of them reckoned as parts of Spain) in Morocco, Rio de Oro, and the Canaries; the district of the Muni and Naya rivers, north of the Gabun; and Fernando Po and Annobon in the Gulf of Guinea. Germany had till 1919 the coast-lands between the Kunene and the Orange River (except the British territory of Walvisch Bay), extending inland to 20° E. long., farther north to 21°, and farther north still, at about 18° S. lat., to the Zambezi near the Victoria Falls; Cameroon, from the Gulf of Guinea to Lake Tsad, to which is attached Adamáwa, with a slice ceded from French Equatorial Africa in 1911; Togoland, between the British Gold Coast Colony and Dahomey; and on the east side, German East Africa, from the Rovuma River to Victoria Nyanza, and from the coast to Lake Tanganyika. These colonies are now governed by mandatories of the League of Nations. Italy has since 1884 occupied Eritrea (the Red Sea coast from Ras Kasar southwards to beyond Assab); her protectorate over Abyssinia came to a disastrous end at Adowa in 1896; but in the war of 1911–12 she wrested Libya (Tripoli and Benghazi) from Turkey. Italian Somaliland extends from Bandar Ziyada to beyond the Juba. The Congo Free State, founded in 1885, became the Belgian Congo when it was taken over by Belgium in 1907–8, and has an area of 910,000 sq. m., with a population estimated at about 20,000,000.

In 1904–13 Morocco was the subject of many European negotiations; and armed intervention was more than once resorted to. In addition to her claim to Ifni and the adjoining coast, Spain had long held a number of stations on and off the north coast. In 1912–13 the zone north of a line running from the Muluya River to Kasr-el-Kebir and the Atlantic was assigned to Spain, except Tangier and its district (140 sq. m.), which were placed under an international council. The Ifni claim was recognised. The remainder of Morocco became a French protectorate (1912). Under pressure from Germany at Agadir, France agreed, in compensation for advantages in Morocco, to readjust the boundaries of Cameroon and French Equatorial Africa. This gave Germany a net gain of 100,000 sq. m., with access to the Congo and the Ubangi.

Abyssinia, released from the short-lived Italian protectorate, is not merely in all other respects a native state, but cherishes relations with France and Russia as well as with Britain, and has pushed her frontiers southward. Liberia (q.v.), which, as inhabited by Africans or persons of African descent, is also a native state, is a republic on the model of the United States. Till 1900 the two Boer states, the Orange Free State and the Transvaal, now original provinces of the Union of South Africa, were in a sense African states, though their civilisation was European in origin. Even within the European spheres of influence many of the tribes are practically as free—and as savage—as ever they were. The interior of Somaliland is utterly savage, though the coasts are British, French, and Italian; as are also the regions round Uganda. The Hausa states of the Western Sudan are now either occupied or administered by European Powers.

Abyssinia is Christian; the Zulu and Bantu states, with Dahomey, are pagan; the rest mainly Mohammedan. The region held by the nomad predatory tribes is mainly the Sahara—Tuareg Hamites and Arabs in the west, Tibbu Hamites in the east. Of the lands under tribal organisation, the most extensive are those of the Monbuttu and of the Zandehs (Nyam-Nyams), about the Nile-Congo water-parting.

Exploration.—The term 'Africa,' originally the name of a small tract on the north coast still surviving in the *Friga* of the Tunisian Tell, was extended under Roman influences to the whole of the 'dark continent,' just as the 'Asia' of the Cayster Valley in Ionia had under Greek influences been extended to the whole of the eastern world. It was the Ethiopia of Homeric, and the Libya of later Hellenic times, terms vaguely applied to the region stretching away to the setting sun, and with undefined southern limits. But neither Greeks nor Romans ever extended their knowledge much beyond the northern verge of the Sahara, and although the Nile Valley was the earliest seat of human culture, with monuments dating back thousands of years before the Christian era, Africa was till lately the least-known division of the globe. Its exploration may be said to have begun with the expedition sent by Sankhara of the 11th (Theban) dynasty to the land of Púnt (Somáliland), as recorded on the Wady Hammamát inscription (2400 B.C.), and after a lapse of over 4300 years, this work of exploration is still far from complete. After the circumnavigation attributed by Herodotus to Necho, son of Psametik I. (26th or Saïte dynasty, 620 B.C.), and the naval expedition of the Carthaginian Hanno round the north-west coast, perhaps to the equator (300 B.C. ?), little was done for the seaboard till the 14th century A.D., when the Dieppe mariners claim to have founded 'Little Dieppe' on the Guinea coast (1364), and colonised the Canaries under Jean de Béthencourt, and when Italian navigators had coasted the north-west side as far as Bojador, as clearly shown on Marco Pizzigani's sketch map (1367), now in the Parma library. Our general knowledge of the periphery was nearly completed towards the close of the next century, when Vasco da Gama doubled the Cape and skirted the east coast northwards to Magadosho in 2° N. lat. (1497–98). But long before this, the spread of Islam in the 7th century, followed in the 11th (1050–78) by the tremendous irruption of nomad hordes from South-western Asia, had converted the greater part of the northern plains into an Arab domain, which was revealed to science by the Arab writers of the next ensuing centuries. Thus a fair knowledge was acquired of the geographical, political, and ethnological relations in the three physical zones of Maghreb (Mauritania), the Sahara, and Sudan by the works of Edrisi (12th century), Yakút, Abu'l-Hassan, and Ibn-Said (13th century), Abu'l-Feda and Ibn-Batúta (14th century), Makrizi, Leo Africanus, and Ibn-Khaldún (15th century), the true pioneers of African exploration. Then followed three hundred years of comparative inactivity, marked by no serious attempt to penetrate far into the interior, and noted chiefly by the occupation of various points on the coast by the Portuguese, Dutch, and English. The Portuguese established relations with the powerful Bantu states of Congo on the west, and Monomotopa on the south-east side; the Dutch obtained a firm footing in the Hottentot country in the extreme south, while the English were attracted more especially to Guinea and Senegambia (Windham's voyage to Guinea in the 16th century, followed by the journey of Jobson and Thomson, and occupation of Cape Coast in 1664).

But the modern epoch of geographical research, apart from political or commercial considerations, begins properly with James Bruce, who discovered the Abai source of the Blue Nile in 1770, and whose adventures in Abyssinia stimulated the foundation of the African Association (1788), which before the close of the 18th century had already sent out

Ledyard, Lucas, Houghton, and Mungo Park to explore the Niger basin.

In the 19th century, the most various motives co-operated in favour of an extended knowledge of this vast continent. The captains of British cruisers employed to suppress the slave-trade supplied some valuable information; the governors of the colonies and private merchants contributed their share; and enterprising travellers from all sides of the coast endeavoured to strike out paths to the interior. In 1802–5, Lichtenstein travelled in the district north of the Cape of Good Hope, and first furnished information regarding the Bechuana tribe. In 1809 Burckhardt was sent out by the African Society, and his explorations, rich in manifold results, occupied the years 1812–16. To the French we are indebted for much valuable information concerning Morocco, Algeria, and the neighbouring parts of Sahara. The labours of Oudney, Clapperton, Denham, and Lander, in the Sahara and Sudan are memorable by the discovery of Lake Tsad and the course of the Niger. From about 1840, our knowledge of South Africa received many important additions from the missionaries stationed there, especially Moffat; while David Livingstone, who from 1843 to 1873 was engaged in trying to open the countries north of the Cape of Good Hope, penetrated in 1849 as far as Lake Ngami, in 20° S. lat.; and in 1853, ascending the Leeambye (Zambezi) northward for several hundred miles, succeeded in crossing the continent to Loanda on the west coast. Having retraced his steps to the point of the Zambezi from which he had started, the adventurous traveller next followed that stream till he reached the east coast, at Quilimane, in 1856. From 1859 to 1863 was spent in various explorations of Lake Nyasa and the neighbouring regions. Again setting out in 1866, he found, in the region south of Lake Tanganyika, the river Chambezi. This river, which is specially known by this name ere it falls into Lake Bangweulu or Bangweolo, is known between that lake and Lake Moero as the Luapula, and farther on joins the Lualaba. Livingstone traced these rivers through the lakes and as far as 4° S. lat. Livingstone's belief was that this basin, now known to be the Upper Congo, contained the head-waters of the Nile. In 1871, along with Stanley, he found the river Rusizi flowing into the north of Lake Tanganyika. After some further exploration of these regions, and new efforts to find the Nile sources, he died at Ilala, beyond Lake Bangweulu in May 1873. Burton and Speke, crossing the Border Mountains from Zanzibar, in 1857, discovered Lake Tanganyika; and the latter then journeying to the NE., discovered the southern part of the great Lake Victoria, which he rightly judged to be the head reservoir of the Nile. A second expedition, undertaken by Speke and Grant in the end of 1860, penetrated as far north as Gondokoro on the White Nile, and added vastly to our knowledge of the eastern equatorial regions of Africa. At Gondokoro, Speke and Grant were met by Sir Samuel Baker, who, accompanied by his heroic wife, pushed on to the south, and discovered in 1864, west of the Victoria, another great lake, which he called the Albert Nyanza. He returned in September 1873 from a second expedition—of a military character—undertaken in 1869, at the expense of the Pasha of Egypt, to suppress slavery in the upper regions of the Nile. The geography, language, and manners of the inhabitants of Abyssinia, Sennaar, and Kordofan have also been greatly illustrated by the efforts of various European travellers.

The researches of Dr Barth and his companions (1850–55) and Dr Gustav Nachtigal (1869–74)—investigating the same central division of the continent as Clapperton and Denham—and Dr Schweinfurth's travels (1868–71) in unexplored regions, enriched our store of knowledge regarding this land of mystery. In 1874–75 Lieutenant Cameron surveyed the lower half of Lake Tanganyika, and walked across tropical Africa from east to west; while H. M. Stanley, after exploring the Shimiyu, southernmost head-stream of the Nile, circumnavigated Lake Victoria, and discovered a lake, which he took for Lake Albert, but which is now known to be Lake Dweru (or George), a small lake communicating (as he himself discovered later) with Lake Edward. Then striking the Lualaba at Nyangwe in the end of 1876, he forced his way down the stream; and arriving at the mouth of the Congo in autumn 1877, demonstrated that the Lualaba and the Congo are identical. In 1877–79 Serpa Pinto crossed from Benguela to Durban in Natal. In 1880 Joseph Thomson explored the route between Nyasa and Tanganyika; and in 1884 he made his memorable journey from Mombasa by Kilima-Njaro and Kenya across Masai Land to Lake Victoria. In 1884 Sir H. H. Johnston camped on Kilima-Njaro, and ascended the main peak to a height of 16,200 feet. Dr G. A. Fischer, in his attempt to relieve Emin Pasha, reached north to Lake Baringo (1885–1886). In 1885 Grenfell discovered the Ubangi, the great northern tributary of the Congo, which he navigated to within 200 miles of the farthest point reached by Dr Junker (22° 40′ E. long.), penetrating westward down the Welle-Makua (1886). It was thus made evident that Schweinfurth's Welle flows, not to Lake Tsad through the Shari, but through the Ubangi to the Congo.

In 1887 Emin Pasha reported by letter repeated exploration of Lake Albert. Meanwhile Stanley's expedition was on its way by the Congo to rescue him. The intricate water-system south of the Middle Congo was also unravelled, especially by Pogge, Wissmann, and Ludwig Wolf (1881–86), who made it evident that the Kwango, Kassai, Sankuru, and Lake Leopold all belong to one magnificent hydrographic system flowing through the Kwa to the Congo at Kwamouth, and including Livingstone's Kassabi (1854). It was on the Sankuru that Dr Wolf made the acquaintance of the pygmy Batwas, one of the smallest races of mankind. The Ogowe system, first discovered by Du Chaillu (1850), ascended by Walker to Lope (1873), and surveyed by Compiègne and Marche to Ivindo (1874), was completely elucidated by De Brazza, Mizon, and Rouvier during various expeditions between 1877 and 1886. The Alima, supposed to be one of its head-streams, was followed to the right bank of the Congo; and the Ogowe itself, reported to be one of the great continental basins, proved to be a coast stream of secondary importance. After visiting it in 1874, Dr Oscar Lenz transferred the scene of his operations to the north, crossing from Morocco to Timbuktu in 1880, and doing excellent surveying work on the route across the Western Sahara. The same route had been followed by Caillié in 1828, himself preceded (1826) by Laing from Tripolitana, and followed by Barth (1853), these besides Mungo Park being the first European travellers that reached Timbuktu during the nineteenth century. Again moving southwards, Lenz ascended the Congo to Nyangwe, and crossed the continent from the mouth of that river to the Zambezi delta in seventeen months (1885–86). He had been preceded by nine expeditions—Livingstone, Loanda to Quilimane, 1854–56; Cameron, Zanzibar to Benguela, 1873–75; Stanley, Zanzibar to Congo mouth, 1874–77; Serpa Pinto, Benguela to Natal, 1877–79; Matteucci and Massari,

Suakin to Niger delta, 1880–81; Wissmann, Loanda to Zanzibar coast, 1881–82; Arnot, Natal to Benguela, 1881–84; Capello and Ivens, Mossamedes to Zambezi delta, 1884–85; Gleerup, Congo mouth to Zanzibar, 1884–86.

These were all routes from east to west or west to east. The first to traverse Africa from north to south (Holub failed in 1886) were Grogan and Sharp, who described their journey in *From the Cape to Cairo* (1901); and they were soon followed. Meantime, although still numerous, and in some places extensive, the blank spaces on the map of Africa are being rapidly filled up, thanks partly to private enterprise, partly to the activity displayed by the officers in the service of the Belgian Congo. Regions that have comparatively recently been fully or partly explored are (1) the Upper Zambesi and the space between that river and the head-waters of the Congo; (2) the region between the Congo and equatorial lakes; (3) the region between the Congo and Shari basins, and thence westwards to the Bight of Biafra; (4) most of Somáli, Kaffa, and Galla Lands; (5) much of the region enclosed by the great northern curve of the Niger.

See works on Africa by Keith Johnston, Reclus, Hartmann, and others; the works and the lives of Bruce, Mungo Park, Livingstone, Baker, Burton, Speke and Grant, Barth, Schweinfurth, Cameron, Stanley, Johnston, Thomson, and other travellers; Jones's *History of African Exploration* (New York, 1875); books on the partition of Africa amongst the European Powers by Silva White (1892) and Scott Keltie (1893; new ed. 1895); Dr R. Brown's *Story of Africa* (4 vols. 1892–95); 'Africa,' in *Stanford's Compendium*, by A. H. Keane (2 vols., 2nd ed. 1904, 1907); also the articles on SCHNITZER, STANLEY (H. M.), &c., and the various countries.

Africander, or AFRIKANDER, is a term for the descendants of European parents born in South Africa. A prominent political party, having for its object the consolidation and extension of the political influence of the Dutch party in South Africa, was long known as the Africander-Bond, but in 1902 changed its name to the South African Party.

Afrit, a powerful evil genie or demon in Mohammedan mythology.

Afzelius, ADAM, Swedish botanist, born 8th October 1750, became professor of Oriental Languages at Uppsala, and in 1785 demonstrator in Botany there. He visited Sierra Leone in 1792, was for a time secretary of the Swedish Legation in London, and in 1812 became professor of Materia Medica at Uppsala, where he died in 1837. As a pupil of Linnæus he edited his autobiography; and he wrote several works on the plants of the Guinea coast.

Ag'ades, once a very important city of Central Africa, and still a great meeting-place of trading caravans, is the capital of the state Aïr or Asben, south of the Sahara, and is built upon the eastern edge of a great tableland, at an elevation of not less than 2500 feet. In the 16th century it probably contained 60,000 inhabitants; now it has some 7000.

Agadir, the southernmost seaport town in Morocco, lies at the mouth of the Sûs, 23 miles SE. of Cape Ghir. Its harbour is the best on the coast, and it was once a place of importance; but the rise of Mogador greatly damaged its standing, and its pop. is now only some 1700. The descent of a German war-ship here in 1911, while Fez was occupied by French troops, made Agadir the centre of European diplomacy and danger, Germany demanding compensation for allowing France a free hand in Morocco.

Agamemnon, son of King Atreus, and brother of Menelaus. After his father's death, he reigned in Mycenæ, and married Clytæmnestra, by whom he had three children—Iphigenia, Electra, and Orestes. When Paris, son of the Trojan king, Priam, carried off Helen, the wife of Menelaus, king of Lacedæmon, Agamemnon, with his injured brother, traversed Greece, exhorting all the leaders of the people to unite their forces in an expedition against Troy. Having gained their alliance, Agamemnon was appointed general-in-chief of the united forces assembled at Aulis in Bœotia, where they were delayed some time. In the *Iliad*, which gives an account of the war that followed, Agamemnon is described as a very stately and dignified figure. After the fall of Troy, he returned home, taking with him Cassandra, the daughter of Priam. Shortly afterwards, he was murdered by Clytæmnestra, aided by Ægisthus, in whose care he had left his wife and children. A tragical fate had always lowered over the house of Agamemnon; and the destinies of his children—Iphigenia, Electra, and Orestes—were the favourite subjects of the three great Greek tragedians. See ÆSCHYLUS.

Ag'ami, the common name of a genus of crane-like birds (*Psophia*), better known as Trumpeters (q.v.).

Agamidæ, a family of squat-bodied, thick-tongued, terrestrial lizards, closely related to the Iguanas (q.v.). They frequent stony and sandy regions. Some measure a foot in length, but most of them are smaller. The skin is frequently beset with thorny scales. The family is confined to the Old World, and is most abundantly represented in Australia. The Thorn-devil or Moloch of Australia, the 'Flying Dragon' (*Draco volans*) of Indo-Malayan countries, the common Agama of Egypt (*Agama stellio*), and the Dabb of the Arabs (*Uromastix spinipes*) are well-known representatives.

Agamogenesis, reproduction without sex, a process of multiplication by division, budding, &c., in which there is no union of sexual elements, but simply more or less discontinuous growth. It is exceedingly common among the lower animals and in plants, but is gradually replaced in the higher by the more specialised method of sexual reproduction. See PARTHENOGENESIS, REPRODUCTION, SEX.

Ag'apæ (Gr. *agapē*, 'love') were love-feasts, or feasts of charity, originally celebrated by the early Christians in connection with the Lord's Supper. Wealthy or well-to-do Christians brought the materials of the feast, in which the poorer brethren who had nothing to bring shared equally. Prayers were said, hymns sung, and church business discussed; and the meetings closed with the 'holy kiss.' The agapæ long maintained something of the early Christian community of goods. Both the Lord's Supper and agapæ were at first celebrated in the evening; but during the persecutions, when the Christians had often to hold divine service before dawn, the Lord's Supper followed the morning service. Later, a formal separation was made between the two rites. In the 3d and 4th centuries, the agapæ had degenerated into a common banquet, where the deaths of relatives and the anniversaries of the martyrs were commemorated; and they ultimately became occasions of debauchery, or were suspected to be so by the heathen. Councils declared against them, forbade the clergy to take any share in their celebration, and finally banished them from the church. Some Protestant sects have instituted a kind of agapæ, tea-meetings with praise and prayer.

Agapem'oné (Gr., 'love-abode'), a community of religious visionaries founded in 1859 at Charlinch, near Bridgewater, Somersetshire, by Henry James Prince, previously a clergyman of the Church of England. It is described in Hepworth Dixon's *Spiritual Wives* (1868).

Agar, a town of India, in the state of Gwalior, 41 miles NE. of Ujjain. It stands in an open plain, 1765 feet above the sea. Pop. 5700.

A′gar-a′gar, the dried sliced stem of a seaweed, used in cookery under the name of Bengal or Japan isinglass. It resembles gelatine, but when made into jelly is less easily liquefied by heat, and is therefore much employed in the cultivation of microscopic fungi. See BACTERIA, GERM THEORY.

Agardh, KARL ADOLF, a Swedish botanist, was born 23d January 1785, studied at Lund, and in 1812 became professor of Botany there. He subsequently took orders, and died a bishop in 1859. In several great works on the algæ, he laid the foundations of our present knowledge of these plants; and he wrote also on economics.—His son, JAKOB GEORG (1813–1901), became his successor in the chair at Lund (1854–1879), and continued his labours on the algæ in a series of important works.

Agaric and **Agaricus.** See MUSHROOM.

Agassiz, JEAN LOUIS RODOLPHE, one of the most eminent naturalists of his time, anti-Darwinian, and assertor of 'centres of creation,' was born at the village of Motier, in the canton of Fribourg, Switzerland, 28th May 1807. At ten years of age he was placed at a college for boys at Bienne, preparatory, as was then understood, to entering upon a mercantile life; but so marked an aptitude for the pursuit of natural history was manifested during his course here, that he was permitted to continue his studies at Lausanne and Zürich, and afterwards at the universities of Heidelberg and Munich, graduating in medicine at the latter institution in 1830.

Prior to his graduation, he prepared a description of the *Fishes of Brazil* (from specimens gathered by Spix, under the patronage of the king of Bavaria), which elicited a warm encomium from Cuvier, with whom he was afterwards associated on terms of intimacy. Near the close of 1831 he repaired to Paris to pursue his investigations at the Museum of Natural History, where, receiving some pecuniary assistance from Baron Humboldt, he was enabled to remain until the autumn of 1832, when he accepted a professorship at Neuchâtel. In 1833 he commenced the publication of his *Researches on the Fossil Fishes*, which the following year brought him from London the Wollaston prize. In 1834 he visited England for the first time, where he was warmly welcomed, and in 1836 commenced an examination of the glacial phenomena of the Alps, his theory of which subsequently found expression in his *Études sur les Glaciers* (1840), and in his *Système Glaciaire* (1847). In 1839 he published a *Natural History of the Fresh-water Fishes of Central Europe.*

In the summer of 1840 Agassiz established a station of observation on the Alps (where, with a corps of assistants, he spent each summer until 1844), and in the following autumn he visited the Scottish Highlands, with gratifying results, for additional evidence in support of his glacial theory.

In October 1846 Agassiz went to America, and delivered in Boston a course of lectures *On the Plan of the Creation.* These at once established his reputation as a popular lecturer, and during the winters of 1847 and 1848 he lectured in the principal cities of the United States, everywhere with success. In 1848 he was elected to the chair of Natural History in the Lawrence Scientific School at Harvard University, and in the summer of that year, in company with a class of students, made a scientific expedition to the northern shores of Lake Superior. At the invitation of Professor Bache, Superintendent of the United States Coast Survey, he spent the winter of 1850–51 in an expedition to the Florida Reefs, his report upon which was afterwards published in the Memoirs of the Museum of Comparative Zoology. In 1851, in addition to his work at Cambridge, he accepted a professorship at the Medical College of Charleston, South Carolina, where he spent the following winter, and in the spring delivered a course of lectures at Washington, before the Smithsonian Institution, of which he was soon appointed a Regent. In 1854 he was invited to a chair in the university of Zürich, Switzerland, which he declined, and the following year, assisted by his daughters, he established at Cambridge a young ladies' school, which was continued for eight years, until closed in consequence of the civil war. Meanwhile, Agassiz had planned an important work, *Contributions to the Natural History of the United States*, of which he lived to issue four 4to vols. He declined a chair of Palæontology at Paris in 1857, but received the Order of the Legion of Honour. In 1858 he gave all his collections (worth $10,000) to the Museum of Comparative Zoology at Harvard. Many of his views were in advance of those commonly held, and contradicted established theological tenets; he did not adhere to the 'special creation' theory, but was 'polygenist' on the question of the origin of man (see ETHNOLOGY). But he could not accept the Darwinian theory of evolution, earnestly controverted it, and was distressed that most of his own disciples became converts to it. A trip to Brazil, primarily for the benefit of his health, developed into one of the most important scientific expeditions of Agassiz's whole life. After an absence of sixteen months, he returned to the United States, the account of his trip, as prepared by his wife, being published under the title of *A Journey in Brazil.* In 1872 he visited California, and next year received for a summer school of Natural History a gift of the island of Penikese in Buzzard's Bay, on the Massachusetts coast, and a money endowment of $50,000. He was organising this unique school when he died, December 14, 1873. He was usually known simply as Louis Agassiz.

See the *Life and Correspondence*, edited by his wife (1886), the monograph by Holden (1893), and the *Life, Letters, and Works*, by Marcou (1896).

His son, ALEXANDER, author of *Contributions to American Thalassography* (1835–1910), was born at Neuchâtel in Switzerland, joined his father at Boston in 1849, graduated at Harvard, and was an assistant in the Harvard Museum in 1860–65. Applying his special training in geology, chemistry, and engineering, he made a fortune in the copper-mines of Lake Superior, but became curator of the Harvard Museum on his father's death in 1873, retiring in 1897. He did much deep-sea dredging; founded the zoological station at Newport, Rhode Island; and wrote on his dredging cruises, on oceanography, on coral formations, and on the embryology of the star-fishes, the flounders, and the ctenophora. He had the Legion of Honour and the Prussian Order of Merit. Like his father, he greatly enriched and extended the Harvard Museum. See his *Letters and Recollections* (1913).

Ag′ate, a mineral composed of layers of quartz, generally of different varieties of colours, intimately joined together. It usually occurs as rounded nodules or veins in trap rock. The layers are often concentric, and in the section sometimes appear nearly circular. The composition varies greatly, but silica is always predominant, usually with alumina and oxide of iron. Chalcedony (q.v.) carnelian, amethyst, common quartz, jasper, opal, and flint occur as layers in agate, and are spoken of as kinds of agate. There are also clouded agates, star-agates, moss-agates, &c., so called from their

appearance. It takes a fine polish, and is much used for ornamental purposes. Many agates are found in Scotland, and are sold under the name of *Scotch Pebbles*.

Ag'atha, ST, a noble Sicilian lady of great beauty, who rejected the love of the Prefect Quintilianus, and suffered a cruel martyrdom in the persecution of Christians under Decius (251). She holds a high rank among the saints of the Roman Catholic Church; her festival falls February 5.

Agathangelus, AGATHANGE or AKATHANKELOS, Armenian historian, lived during the 4th century, and wrote a history which, as now known, treats of the life and doctrine of St Gregory the Illuminator, and of the conversion of Armenia to Christianity. See Langlois, *Collection des historiens de l'Arménie* (vol. i. 1867).

Agatharchus, Athenian painter of the 5th century B.C., said by Vitruvius to have been the first to paint a scene for the acting of tragedies. On that account, however, he did not, as has been held by some, introduce perspective and illusion.

Agathias (*c.* 536–82), Greek poet and historian, was educated at Alexandria and Constantinople, and practised as an advocate. He wrote love verses, and made an anthology. But his most valuable work is his history of his own time, a continuation of Procopius and the chief authority for the period 552–58.

Agath'ocles, Tyrant of Syracuse, was born at Thermæ, in Sicily, in 361 B.C. As leader of the popular party in Syracuse, he was twice driven into exile, but ultimately made himself autocrat of Syracuse, after a massacre of several thousands of citizens, 317 B.C. Having failed in an attempt to expel the Carthaginians from Sicily, he passed over to Africa, and attacked them there. This war he carried on with success for four years, or until 307 B.C., when he suffered a serious defeat, and basely abandoning his troops to the enemy, escaped safely into Sicily. There, by fraud and bloodshed, he soon recovered his former power; but in 289 B.C. one of his favourites destroyed him by means of a poisoned toothpick.

Agathon (*c.* 448–400 B.C.), Athenian tragic poet, the friend of Euripides and Plato. After Æschylus, Sophocles, and Euripides, he holds a position of first importance. In his plays he introduced various innovations, as, in his *Anthos*, the use of an invented in place of a borrowed mythological plot. He is mentioned by Plato (*Symposium*) and ridiculed by Aristophanes (*Thesmophoriazusæ*). He survives only in fragments.

Aga've, a genus of plants of remarkable and beautiful appearance, belonging to the family Amaryllidaceæ (q.v.). There are a number of species, all natives of Mexico and Central America. They are often popularly confounded with Aloes (q.v.); and *Agave americana* is generally known by the name of American Aloe. The agaves have either no proper stem, or a very short one bearing at its summit a crowded head of large, fleshy leaves, which are spiny at the margin. From the midst of these shoots up the straight, upright scape, 24 to 36 feet high, and at the base often 1 foot in diameter, along which are small, appressed, lanceolate bracteæ, with a terminal panicle, often bearing as many as 4000 flowers. In Mexico, these plants usually flower in the seventh or eighth, sometimes even fifth or sixth year, and even in poor soils or exposed situations seldom later than the twelfth year, but in our hothouses not until they have reached a very advanced age (80–100 years); whence arises the gardeners' fable of their flowering only once in one hundred years. After flowering, the plant always dies down to the ground, but new plants arise from lateral buds. The best known species is *Agave americana*, which was first brought to Spain in 1561, and has become naturalised in Naples, Sicily, Greece, and the north of Africa. By maceration of the leaves, which are 5 to 7 feet long, are obtained coarse fibres, which are used under the name of *maguey*, for the manufacture of thread, twine, ropes, hammocks, &c. This fibre (also known as Pita Flax) is not very strong or durable, and if exposed to moisture it soon decays. The ancient Mexicans employed it for the preparation of a coarse kind of paper, and the Indians use it for oakum. The leaves, cut into slices, are used for feeding cattle. When the young scape has been cut out, the sap continues to flow into the cavity for a considerable time. This is termed *aguamiel*, and contains a considerable amount of sugar. It is collected daily, and after rapid fermentation furnishes the national beverage called *pulque*. This is milky, sour, and ill-smelling, resembling thin buttermilk, and strongly recalling the flavour of rotten eggs. In large quantities it produces a dull intoxication followed by heavy sleep. The strong spirit of the country (*aquardiente* or *mescal*) is also distilled from it. *Agave americana*, *Agave lurida* (by gardeners called *A. mexicana*), and other species are extensively cultivated for these purposes. The valuable Sisal-hemp (q.v.) is produced by several species (see FIBROUS SUBSTANCES).

Agde, an ancient French town in the department of Hérault, situated about 3 miles from the Mediterranean Sea, on the left bank of a navigable stream, the mouth of which forms a harbour. It has a brisk coast-trade, while it is also the entrepôt for the traffic of the south and west of France. It stands on the lava from an extinct volcano, and is the ancient *Agatha Narbonensis*, originally a Greek colony. Pop. 9000.

Age is used specially to denote certain long periods in the history of the human race or of human civilisation. The idea of a succession of ages presented itself at a very early period to the Greek mind. The life of the race was likened to that of the individual—hence the infancy of the race might easily be imagined to be the most beautiful and serene of all. Hesiod mentions five ages—the golden, simple and patriarchal; the silver, voluptuous and godless; the brazen, warlike, wild, and violent; the heroic, an aspiration towards the better; the iron, in which justice, piety, and faithfulness had vanished from the earth, the time in which Hesiod fancied that he himself lived. Ovid imitates him, but omits the heroic age. This idea, at first perhaps a mere poetic comparison, gradually worked its way into prose. These ages were regarded as the divisions of the great world-year, which would be completed when the stars and planets had performed a revolution round the heavens, after which destiny would repeat itself in the same series of events. The golden age was said to be governed by Saturn; the silver, by Jupiter; the brazen, by Neptune; and the iron, by Pluto. The geological ages or periods will be found discussed at GEOLOGY; while the Stone, Bronze, and Iron ages (or rather stages) of the archæologist are treated under these heads. The *Middle Ages* have been so called as intervening between classical antiquity and modern times. The *Dark Ages*, nearly coinciding in time with the middle ages, refer to the period of intellectual darkness from the decline of classical learning, after the establishment of the barbarians in Europe in the 5th century, till the Renaissance (q.v.) in the 15th century. Modern philosophical speculation has also attempted to divide human history into definite ages or periods.

Fichte numbers five, of which he conceives that we are in the third; Hegel (q.v.) and Auguste Comte reckon three (see POSITIVISM). The word Age is also very familiar in such phrases as the Augustan Age, the Elizabethan Age, &c. In the life of an individual, it is usual to speak of four ages — infancy, youth, manhood, and old age; though some physiologists (like Shakespeare in *As You Like It*) count seven—infancy, childhood, boyhood or girlhood, adolescence, manhood or womanhood, age, and old age. See LONGEVITY.

Age. The legal divisions of human life differ considerably in different countries. In England the whole period previous to twenty-one years of age is usually spoken of as *infancy*, a term which has a totally different signification in those countries that have followed the civil law. The condition of infancy in English law, however, is not one of uniform incapacity throughout or for all purposes. Thus the marriages of boys over fourteen and girls over twelve, if duly celebrated, are valid. Infancy, generally, is for the protection of civil rights. By a statute of 1874 it is declared that contracts for the loan of money and supply of goods to infants, and 'accounts stated' with infants, are void. But contracts entered into by infants for necessaries are valid. An infant committing a wrongful act to the injury of another is liable to an action of tort. He cannot make a will unless he is a soldier on active service or a mariner at sea. He cannot bring or defend an action without the assistance of an adult. In criminal law a child under seven years is incapable of felony, and up to the age of fourteen there is a presumption against the existence of a criminal mind and intention; but infants between fourteen and twenty-one are fully responsible for criminal acts. Modern legislation has made special provision for the trial and punishment of children under sixteen.

By the law of Scotland, again, life is divided into three periods—*pupilarity*, *minority*, and *majority*. The first extends from birth to the age of legal puberty, which is fourteen in males and twelve in females, at which ages they may respectively marry; the second embraces the period from the termination of pupilarity till the attainment of majority, which takes place at the age of twenty-one in both sexes; and the third includes the whole of after-life. The office of *tutory* corresponds in duration to pupilarity, that of *curatory* to minority (see TUTOR, GUARDIAN). By the intervention of a tutor or curator contracts may be made binding on a person who is not of full age. In Scotland a minor can dispose of his movable estate by testament. The rules as to the criminal responsibility of young persons are similar to those prevailing in England. In France the marriageable age is eighteen in males, and fifteen in females, an arrangement more reasonable than that which we have borrowed from the Romans, which, however suitable it may have been to the climate of Italy, could never have been free from inconveniences in this country. Twenty-one is generally the age at which men are eligible for public offices; and at this age they may elect, and be elected, members of parliament. But a man must be twenty-four before he can be admitted to priests' orders in the English Church, and thirty before he can be a bishop.

In the United States full age is the day preceding the twenty-first anniversary of a person's birth. All persons under seven years of age are incapable of crime; and between the ages of seven and fourteen the legal presumption is they are not capable of crime, but this assumption may be rebutted by strong and clear proof of a mischievous discretion or knowledge of the wrong. The presumptions of innocence cease at the age of fourteen, at which times males may choose their own guardian, and at eighteen may enlist in the army. Females are supposed to arrive at discretion at twelve years of age, and may consent to marriage, and at fourteen choose their own guardian. In some of the states they become of full age at eighteen. A male may vote at twenty-one, be elected a representative to congress at twenty-five, and a senator of the United States at thirty.

The legal disabilities attaching to the different stages of minority, or, to speak more correctly, the privileges which the law confers on minors for their protection, will be treated of under the different subjects to which they relate (see CONSENT, CONTRACT, CRIME, GUARDIAN, INFANT, MARRIAGE). The ascertainment of age is an interesting problem in medical jurisprudence. The most reliable evidence afforded by the skeleton is that connected with the teeth, the skull, and the general character of the bony attachments.

Agen, the chief town of the French department of Lot-et-Garonne, situated in a fertile region on the right bank of the Garonne, 84 miles SE. of Bordeaux, is old and gloomy in appearance; it carries on an active trade in woollen and linen fabrics, leather, coloured paper, colours, cordage, sail-cloth, fruits, vegetables, and tobacco, and is an important railway centre. Agen (*Aginnum*) was the capital of the Keltic tribe of Nitiobroges, as it was later of the province of Agenais. There are extensive remains of the Roman town. The bishopric of Agen was founded in the 4th century. The cathedral dates in part from the 12th century. In Agen Joseph Scaliger and the poet Jasmin were born. It often suffered the miseries of war at the hands of Goths, Huns, English, and Huguenots. Pop. 24,000.

Agenais, a former province of France, long in the possession of the kings of England, now forms most of the department of Lot-et-Garonne. The capital was Agen (q.v.).

Agence Havas. See HAVAS AGENCY.

Agent is a person having express or implied authority to represent or act on behalf of another person, who is called his principal. Any one who is capable of contracting may enter into a contract through an agent. Agents may be either general or special. A general agent is one who is empowered to act for his principal in all matters or in all transactions relating to a particular trade or business. A special agent is one who has only authority to do some particular piece of business, e.g. to buy a particular thing. The appointment of an agent may be express or may be implied from the conduct of the parties. The relation of principal and agent is in the ordinary case created by verbal agreement, and in many cases without any express agreement at all. But if the agent is to contract under seal, he must be appointed by a deed which is known as a 'power of attorney.' An act done without authority may subsequently be ratified by the person on whose behalf it was done, and the ratification invests the person who did the act, the person who ratified it, and third parties with the same rights and liabilities as if the act had originally been done with the authority of the person on whose behalf it was done. The authority of an agent varies with the general or special character of his employment. He has implied authority to do whatever is necessary for, or incidental to, the carrying out of his express authority in accordance with the usage of the particular trade or business in which he is employed. Agents are classified according to their functions, e.g. auctioneers, brokers, commission agents, factors, stock-brokers, bankers, insurance-brokers, and law-agents. The powers and liabilities of these different classes of agents are fairly well fixed by mercantile custom or trade usage.

Third parties dealing with an agent are not concerned with unusual restrictions, unknown to them, placed upon his authority. The agent is bound to carry out with care the instructions given. He is not liable for the solvency of customers, unless he has accepted a *del credere* commission. He is bound to keep accounts, and it is not permissible for him, without the consent of his principal, to enter into any transaction in which his interests will conflict with his duty towards his principal. He is entitled to reimbursement of expenses, and to indemnification in respect of liabilities, in so far as properly incurred in the discharge of the duties of his employment. If the principal is named, or otherwise known, *prima facie* the agent undertakes no liability to the customer. If the principal's existence is undisclosed, the other contracting party, on discovering it, has an option whether he will hold agent or principal liable. Principals are generally liable for the fraud and misrepresentation of an agent committed in the line of the business. A mercantile agent who, with the consent of the owner, is in possession of goods or of the documents of title to goods, has, by statute, an implied authority to sell or pledge the goods. Any secret profit received by the agent must be accounted for and paid over to the principal. Under the Prevention of Corruption Act, 1906, an agent who corruptly accepts any gift or consideration for doing, or forbearing to do, any act in relation to his principal's affairs is guilty of a misdemeanour. Agency may be terminated by revocation on the part of the principal or by renunciation on the part of the agent.

In the United States the principles applicable to the relation of principal and agent are substantially similar to those applied in England.—For the duties of consular and diplomatic agents, see CONSUL, DIPLOMACY.

Agent and Client. The employer of a law-agent is entitled to presume that he is possessed of competent professional knowledge, and the agent is consequently responsible to his client for the consequences of want of reasonable care and skill, or gross ignorance in the conduct of the business entrusted to him. He does not guarantee that his advice shall be correct. A law-agent is not entitled to receive a gift from his client, or to make gain for himself at the expense of his client over and above his professional fees. He, in security for the payment of his business account, has a lien over title-deeds and other documents in his possession belonging to the client. See SOLICITOR, WRITER TO THE SIGNET.

Agent-general is the representative in London of Newfoundland, of a Canadian province, or of an Australian state.

Ageratum, a tropical American genus of Compositæ (Tubulifloræ) akin to hemp agrimony, with about thirty species. Some, with white or lavender-blue flower-heads, are used for summer bedding in garden borders. *A. conyzoides* is an exceedingly common weed in Ceylon and other tropical countries.

Agesila'us (444–360 B.C.), king of Sparta, was elevated to the throne (399) chiefly by the exertions of Lysander. He was one of the most brilliant soldiers of antiquity. Being called upon by the Ionians to assist them against Artaxerxes, he commenced a splendid campaign in Asia; but was compelled by the Corinthian war, in which several of the Greek states were allied against Sparta, to leave his conquest over the Persians incomplete, and return to Greece. At Coronēa (394 B.C.), he gained a victory over the allied forces, and in 386 the war was concluded by a treaty of peace in favour of Sparta. Afterwards, in the Theban war, though hard pressed by Pelopidas and Epaminondas, and defeated at Mantinea (362), he bravely and ably defended his country. He fought a campaign in Egypt, and returning, he died in his 84th year.

Agglomerate, or VOLCANIC AGGLOMERATE, is a rock made up of a confused mass of angular and subangular blocks of all sizes. The blocks may consist exclusively of igneous rocks, or of sedimentary rocks, or of both, set in a more or less meagre matrix of finer-grained detritus of the same materials. The rock is of volcanic origin, and is frequently found in Scotland filling up vertical holes or pipes which seem to have been the throats or necks of ancient volcanoes.

Agglutinative Language. See PHILOLOGY.

Aghrim, a hill in Galway, Ireland, 30 miles SW. of Athlone. Here, on 12th July 1691, Ginkell defeated the French and Irish adherents of James II. under St Ruth.

Agincourt, now AZINCOURT, a small village in the centre of the French department of Pas-de-Calais, celebrated for a bloody battle between the English and French, October 25, 1415. The internal distractions of France under the imbecile Charles VI. had encouraged England to attempt to make good her ancient claims. Henry V. of England had landed at Harfleur, had taken that fortress, and was marching to Calais, in order to go into winter-quarters. But a French army, vastly superior in number, intercepted the English march to Calais, near the village of Agincourt. The invading army, weakened in numbers and suffering from want of provisions, was still 14,000 strong; the French, under the Constable D'Albret, numbered 50,000 or more. The battle lasted three hours, and was a signal victory for the English, due mainly to the archers. As many as 10,000 Frenchmen are said to have fallen, among whom were the Constable, three dukes, and ninety barons. Five princes, among them the Dukes of Orleans and Bourbon, were taken prisoners. The English lost 1600 killed.

A'gio, an Italian word, is used, generally in connection with continental exchanges, to denote the difference between the real and the nominal value of money, or between coin and paper money; also the variations from fixed pars or rates of exchange. It sometimes also corresponds very nearly to the English word 'premium.' See EXCHANGE.

Agis, the name of several kings of Sparta, of whom the most noted was Agis IV. He came to the throne in 244 B.C., when the state of Sparta had fallen into a ruinous condition through long-continued war. The riches of the state were in the hands of a few persons, while a great majority of the people were in extreme indigence. Agis, therefore, in accordance with the old laws of the state, proposed the increase of the number of citizens by the admission of a certain number of Helots and aliens, to be followed by the redistribution of landed estates by lottery. But insuperable difficulties were thrown in the way; the people were persuaded that his schemes were inimical to the welfare of the state; and Agis was put to death by strangulation (241 B.C.).

Agna'no, till 1870 a small lake 3 miles west of Naples, about 60 feet in depth, and without visible outlet. As it caused malaria, it was drained. The surrounding country is volcanic and mountainous. On the right lies the *Grotta del Cane* (q.v.), and on the left are found the sulphurous vapour-baths of *San Germano*.

Agnate (Lat. *agnatus*). Agnates, in the law of Scotland, are those of a person's kindred who

are related to him through his father, as distinct from those who are related to him through his mother and who are called cognates. In the Roman law, both of these terms had a somewhat different signification. Agnates, by that system, were persons related through males only, whilst cognates were all those related to each other by blood. As persons descended from a common parent were *cognati*, the term *cognatus*, generally speaking, comprehended *agnatus*. In Rome the distinction between agnates and cognates was founded on an institution which has not been adopted in the Roman sense by any modern nation —that, namely, of the *patria potestas*. Roman agnati were all those who either were actually under the same *paterfamilias*, or would have been so had he been alive. *Agnatio* arose only from birth *ex justis nuptiis*; birth from gentile marriage (*nuptiæ non justæ*) set up merely cognatic ties. Agnatic relationship might arise otherwise than by birth, e.g. a person who entered a *familia* by Adoption (q.v.) became at once an agnate of all the agnates of the *paterfamilias*. The emancipation of a child, since it extinguished the *patria potestas*, destroyed the agnatic, but not the cognatic, relationship between the child and his old family group. In the latest Roman law of intestate succession, introduced (Nov. 118 and 127) about ten years after the promulgation of the *Corpus Juris*, there is hardly to be found any trace of the old system of agnation.

Agnes, St, according to legend, was a beautiful Roman Christian in the time of Diocletian, who, having in her thirteenth year refused the heathen son of the prætor, was exposed in a public brothel. The miraculous growth of her hair, the blinding of the prætor's son, his restoration to sight, and the refusal of the flames to touch her—all could not save her from the executioner's sword. Her festival falls on January 21, and her symbol is a lamb. See Pallium.

Agnesi, Maria Gaetana, a woman remarkable for her varied attainments, was born at Milan in 1718. In her ninth year she could converse in Latin, and soon acquired a mastery of Greek, Hebrew, French, Spanish, and German. Her father invited parties of learned men to his house, with whom, in spite of her retiring disposition, Maria disputed on philosophical points. Of her discourses on these occasions, her father published specimens, called *Propositiones Philosophicæ* (1738). After her twentieth year, she devoted herself to the study of mathematics, wrote an unpublished treatise on Conic Sections, and published her *Instituzioni Analitiche* (1748). The latter was a work of permanent value, and was translated into French and English. When her father was disabled by infirmity, she took his place as professor of Mathematics in the university of Bologna, by the appointment of Pope Benedict XIV. After her father's death in 1752, she made theology her study, and ultimately entered a convent at Milan, where in 1799 she died at the good old age of 81.

Agni, Indian god of fire. See India (*Religions*).

Agno'né, a town of South Italy, 22 miles NW. of Campobasso. It is noted for its copper and steel manufactures. Pop. 10,000.

Agnosticism, a word introduced into the English language by Professor Huxley, in 1869. The term was suggested to him by the inscription, *Agnōstō Theō* ('To an Unknown God'), which the apostle Paul saw on an Athenian altar, as recorded in Acts, xvii. 23. It connotes the doctrine that man does *not know* anything about spiritual existences, whether divine or human, or about a future life. The advocates of agnosticism employ two methods of argumentation in support of their position—viz. the *sceptical* and the *critical*. In their reasoning against spiritualism, they are careful to guard themselves against the charge of positive Atheism (q. v.) on the one hand, and of philosophical Materialism (q. v.) on the other. They frankly admit that there is more than matter and force in the universe. The phenomena of consciousness and mental activity cannot, they grant, be put in the same category with the properties of matter. With the former, they admit, physical science cannot deal. 'The passage,' says Professor Tyndall, 'from the physics of the brain to the corresponding facts of consciousness is unthinkable.' Consciousness, they assert, is a function of the brain, as motion is a function of the muscles. As to *how* the stimulation of a sensory nerve gives rise to consciousness, or the stimulation of a motor nerve to muscular contraction, they avow blank ignorance. *Perhaps*, they say, consciousness inheres in a substance other than material; and *perhaps* the series of conscious states, at present associated with man's material organism, *may* continue to exist apart from it; but these things they do not profess to know. As regards the existence of a God, they say that, having regard to the universality of the law of causation, they cannot refuse to admit an eternal existence, and that, in view of the doctrine of the conservation of energy, they must also grant the *possibility* of an eternal energy. Further, if the existence of immaterial phenomena in the form of consciousness is admitted, an eternal series of such phenomena must be regarded as *possible*. Thus, an eternal existence possessed of consciousness and energy *may be* the First Cause of all things. Agnosticism, however, leaves it an open question whether energy is eternal *a parte ante;* and as to consciousness it maintains that there is no positive evidence that the first cause possesses *it* at all. The only thing certain, accordingly, is that an eternal existence of some sort must be postulated. Though their belief in the universality of the law of causation shuts them in to this positive conclusion, at the same time agnostics are careful to state that causation cannot be proved by any amount of experience—thus following Hume and Kant, who taught that our only knowledge is of phenomena or sequences. 'The only meaning,' says Professor Huxley, 'of the law of causation in the physical world, is that it generalises universal experience of the order of the world; and if experience shows [and he says it does] a similar order to obtain among states of consciousness, the law of causation will properly express that order' (*Life of Hume*, pp. 184–5). 'Universal experience' of the 'order' of phenomena is, according to this statement, all that is meant by the law of causation. *Why* phenomena fall into this order, the agnostic does not profess to know. This being so, it follows that, as it is only in consciousness we apprehend phenomena, agnosticism leaves it problematical whether an external world exists at all. *Perhaps* the Idealism of Berkeley (q.v.) is the soundest philosophy. Or, linking human consciousness to a possible eternal series of conscious states, it *may be* that the Pantheism of Spinoza (q.v.) is the most satisfactory solution of the mystery of existence. Owing to the reverence of agnostics for the law of causation, they repudiate free-will. Agnosticism may be regarded as Positivism without its dogmatism. See Mansel, Positivism, Relativity of Knowledge, Spencer; Sir Leslie Stephen's *Agnostic's Apology* (1893), Professor Flint's *Agnosticism* (1903).

Agnus Dei (Lat., 'Lamb of God'), a title of Christ; also the name given to a prayer in the Mass beginning with these two words. In the musical

reference it is the sixth or last section of the Mass. The figure of a lamb bearing a cross, stamped upon a disc of wax, silver, or gold, as a symbol of Christ, is also styled an Agnus Dei. Such medals have been consecrated by the popes, in certain years of their pontificate, since the 14th century, for distribution among the faithful at Easter, and were worn as amulets.

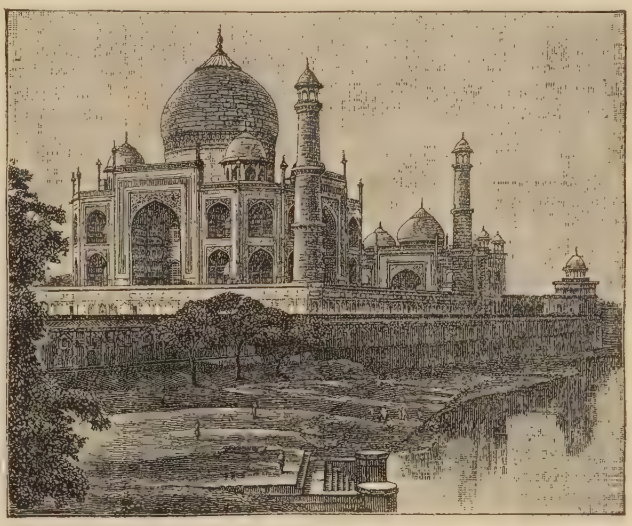
Agonic Line, the line of no magnetic variation, is an irregular line passing through the magnetic poles of the earth, along which the magnetic needle points directly north or south; see MAGNETISM.

Ag'ora, the public square and market-place of an ancient Greek town, corresponding to the *forum* of the Romans, the scene of pubic meetings for social or political purposes. The name was also applied to the general assemblies of the people.

Agoult, MARIE DE FLAVIGNY, COMTESSE D' (1805–76), a French author known under the literary pseudonym of 'Daniel Stern,' was born at Frankfort, and educated at a convent in Paris. She married the Comte d'Agoult in 1827, but left him and formed a connection with Liszt. To him she bore three daughters, the eldest of whom married Émile Ollivier; the second, Guy de Charnacé; and the third, first Hans von Bülow, and afterwards Richard Wagner. Amongst 'Daniel Stern's' works are the half-autobiographic romance *Nélida*, *Lettres Républicaines*, *Histoire de la Révolution de 1848*, and *Mes Souvenirs, 1806–33*. Her *Esquisses morales* (1849) is admittedly her best work. Spite of her moral laxity, her *salon* was frequented by such men as Alfred de Vigny and Sainte-Beuve; but when, after 1848, she joined the ultra-democratic party, their place was taken by Lamartine, Enfantin, and Louis Blanc.

Agouti (*Dasyprocta agouti*), a small South American rodent allied to the guinea-pig. The colour of its coarse hair varies from brown to yellow; the form is compact; the legs are slender and pig-like, with three toes on the hind-feet; the ears small and rounded; the tail rudimentary. The agouti lives in the forests of Guiana, Brazil, and Peru, is a gregarious animal, and makes its home at the foot of trees. It is active and agile in its habits, and, usually at night, uttering a grunting cry, wanders in search of food into the plains, where it does much damage to sugar plantations. In Guiana and the West Indies this form is represented by Azara's agouti (*D. azaræ*), and by a smaller form, the acouchy. The black-and-yellow rumped kinds are also West Indian, and are very well known. Darwin in *A Naturalist's Voyage* gives the name to the Patagonian cavy. Several species known as 'pampas hares' are hunted as game in southern Brazil and the regions to the south.

Agra, capital of a province, one of the United Provinces of Agra and Oudh, on the right bank of the Jumna, 139 miles SE. of Delhi by rail, and 841 NW. of Calcutta. The ancient walls of the city embraced an area of about 11 sq. m., of which about one-half is now occupied. The houses are for the most part built of red sandstone, and, on the whole, Agra is the handsomest city in Upper India. Some of the public buildings, monuments of the house of Timur, are on a scale of striking magnificence. Among these are the fortress built by Akbar, within the walls of which are the palace and audience-hall of Shah Jehan, the Moti Masjid or Pearl Mosque, and the Jama Masjid or Great Mosque. Still more celebrated is the Taj Mahal, situated without the city, about a mile to the east of the fort. This extraordinary and beautiful mausoleum was built by the Emperor Shah Jehan for himself and his favourite wife, who died in 1629; and 20,000 men were employed incessantly on it for twenty-two years. The complexity and grace of the general design, and the elaborate perfection of the workmanship, are alike remarkable. The main features of the building are the mausoleum in the centre, on a raised platform, surmounted by a beautiful dome, with smaller domes at each corner, and four graceful minarets (133 feet high). The principal parts of the building are constructed of white marble; and the mosaic-work of the interior is singularly rich and beautiful. British edifices are the Government House, the Government College, three missionary colleges, the English church, and the barracks. There is trade in cotton, tobacco, salt, grain, and sugar, and manufactures of shoes, pipe-stems, and gold lace, and of inlaid mosaic-work. Pop. (1901) 188,300; (1921) 185,946, of whom about 50,000 are Mohammedans.



The Taj Mahal.
From a photograph by Frith.

This city is held in great veneration by the Hindus, as the scene of an incarnation of Vishnu. Till Aurungzebe removed to Delhi in 1658, it was the capital of the Mogul sovereigns. It was taken in 1784 by Sindhia, and surrendered in 1803 to Lord Lake. From 1835 till 1862 Agra was the seat of government for the North-west Provinces. In June 1857 the Europeans had to retire to the Fort or Residency, but Agra was relieved early in October. Sikandra is a suburb.

Agra and Oudh, THE UNITED PROVINCES OF, a governorship (by Act of 1919) of British India, called 'the North-western Provinces' till the constitution of a new North-west Frontier Province beyond them in 1911, extends from Bengal to the Punjab, lies in the upper basin of the Ganges and Jumna, and constitutes a great part of Hindustan proper. It is an alluvial plain sloping from the Himalayas, and comprises the great wheat country. The headquarters of Hinduism, it contains some of the most sacred memorials of the Aryan race, but was long subject to Moslem sway; some 13 per cent of the population are Mohammedans. The divisions are

Meerut, Agra, Gorakhpur, Kumaun, Rohilkhand, Allahabad, Benares, and (for Oudh) Lucknow and Fyzabad. Area, 107,164 sq. m.; pop. (1901) 47,692,277; (1921) 45,590,946, besides native states with an area of 5000 sq. m., and a pop. of 1,135,000. The capital is Allahabad. See INDIA, OUDH.

Agram (Croatian, *Zagreb*), formerly capital of the province of Croatia and Slavonia, in the Hungarian division of the Austro-Hungarian monarchy, since 1918 a town of Yugoslavia, lies at the foot of a richly wooded range of mountains, 2 miles from the Save, and 142 miles NE. of Fiume. There are an upper town, built upon two eminences, a lower town, and an episcopal town. The noble Gothic cathedral dates partly from the 11th century. An earthquake in November 1880 made great havoc. The university was founded in 1874. Pop. (1900) 61,002; (1910) 79,038; (1920) 108,338.

Agrarian Laws, the land laws of the ancient Romans, of which the most notable was that of Licinius Stolo, 367 B.C., which provided that every Roman citizen should be entitled to a portion of unalloted state land not exceeding 500 *jugera*, and to feed on the public pasture land 100 large or 500 small cattle. In 133 B.C. Tiberius Sempronius Gracchus revived and extended it. Various agrarian laws were subsequently passed in a contrary sense; see GRACCHUS, LAND LAWS, ROME.

Agri'cola, CNÆUS JULIUS (37–93 A.D.), a Roman statesman and soldier born at Forum Julii (now Fréjus, in Provence), served with distinction in Britain, Asia, and Aquitania, and in 78 A.D. was sent by Vespasian as governor to Britain. He was the first to subdue the island, defeated the Caledonians under Galgacus (86 A.D.) at the Grampians, and constructed a chain of forts between the Clyde and Forth, but was recalled by the jealous Domitian in 87 A.D. See ENGLAND; and for the famous life of him by his son-in-law, see TACITUS.

Agricola, JOHANN (originally Schnitter or Schneider; 1492–1566), born at Eisleben, became a Lutheran, and was appointed to a chair at Wittenberg, which he lost as an Antinomian. He was ultimately court preacher at Berlin, wrote many theological works, and made a famous collection of German proverbs.

Agricola, RUDOLPHUS (really Huysman; 1443–1485), foremost scholar of the 'New Learning' in Germany, was born near Groningen, in Friesland; studied at Groningen, Louvain, Paris, and in Italy; and lectured at Heidelberg and Worms. He wrote and argued against scholasticism, and was also a musician and painter.

Agricultural Holdings Acts. See LANDLORD AND TENANT.

Agriculture is still the largest single industry of the British Islands, and despite depression, still bids fair to play a leading part in the life of the nation. The value of agriculture to the community is to be measured not only by the profit it produces, although in this respect it is the most important of all industries, because more than any other it creates wealth where none existed before; but it is also the great mother of men, and provides the most stable and healthy element in the population of the state. Probably no nation can long maintain its greatness unless a considerable proportion of its citizens are occupied upon the land.

In the development of agriculture three stages may be distinguished, which to a certain extent succeed one another in point of time, though all three may be seen in operation together. These may be defined as the Extensive, the Conservative, and the Intensive methods of cultivation. In extensive agriculture, which is practised by all primitive communities, on land which is being settled for the first time, and on poor lands in the settled countries, the farmer depends wholly upon the fertility which may naturally have accumulated in the soil. He farms wide areas of land, from which with the minimum of toil he removes either crops or the products of grazing animals, continuously robbing the soil and doing nothing to replace the plant-food he removes. Such is the farming of the pastoral nations or of the first settlers upon the virgin soils of North America, the Argentine, &c.; it may be seen again on the rough sheepwalks which still exist in the elevated portions of the British Islands. This extensive form of farming must result in the steady lowering of the accumulated fertility of the soil, though when the land is simply pastured the losses are so small that they are balanced by various natural recuperative actions which go on in the soil.

Under the conservative system of farming the area at the disposal of the farmer is smaller, and he looks to maintain this fertility unimpaired while still drawing from the land a steady revenue of crops and animals fit for food. Such agriculture demands a much greater expenditure of labour on cultivation so as to make the most of the plant-food in the soil; it also demands the return to the soil of the manure made by the stock out of some of the crops that are raised; and, lastly, it involves the growth at regular intervals of leguminous crops which gather nitrogen from the atmosphere and so restore the chief element of fertility. Such a conservative system of farming prevailed in the settled countries of Europe up to the early years of the nineteenth century, and still goes on to-day. In its most finished form it may be seen in a farm worked upon the old four-course rotation, in which turnips and clover consumed by the stock are alternated with wheat and barley. Up to 1830 practically no extraneous source of fertility was available—all the manure had to be made upon the farm and had been drawn from its own soil; but as the sales were confined to wheat and barley grain and to meat, the annual draft on the inherent fertility of the land was small, and as regards nitrogen was balanced by the amount of this element gathered from the air by the growth of the clover-crop. The old English records seem to show that under these conditions land of average quality could be maintained at a pitch of fertility that would yield about twenty bushels of wheat to the acre.

Intensive agriculture has only been possible since 1840, when the discovery of artificial manures in the shape of fertilisers gave the farmer in Great Britain a chance of importing fertility to his land. About that time nitrate of soda and Peruvian guano began to be imported; science taught the necessity of phosphoric acid and opened up the stores which are contained in coprolites and other phosphatic rocks; still later the vast accumulations of potash in Germany became exploited, more extensive deposits of phosphoric acid were discovered, and the amount of this material available was increased by the manufacture of basic slag as a waste product in steelmaking. Not only did science and industry put a greater range of fertilising materials at the disposal of the farmer, but the revolution in the methods of transport effected by steamships and railroads brought to the farmer the products of distant lands, so that British soils became, and still continue to be, enriched with the fertilising materials contained in the maize, linseed, cotton-seed, &c. grown in other countries following a more primitive method of agriculture. By the help of this imported plant-food a given area of land may be made to produce greatly increased crops and both more and better stock; as a rule this imported fertility is moderate in amount and only

serves to raise the general level of production of the farm, but some farms exist which are little more than manufactories, where the soil is only a medium converting raw fertilising materials into crops and stock.

The natural development of agriculture is from the extensive through the conservative to the intensive form of cultivation. Indeed, the last word must be with the intensive form, as the world's population overruns the land available. At the present time, however, even in the oldest communities, all three forms may be seen in work simultaneously; the more remote the farm from the cities and the poorer the land, the more will the farmer be driven to a conservative system of farming with the minimum of outlay, while on the poorest land nothing but the extensive system of farming can return a profit. It may be taken as a maxim in agriculture that rich land, in itself possessing considerable natural fertility, will alone repay expenditure on fertilisers and feeding-stuffs. It is usually unprofitable to attempt to convert a poor land into good by high cultivation and liberal manures; only high prices and crops of more than average value will repay intensive farming on indifferent land. Intensive farming naturally calls for higher skill and greater knowledge on the part of the farmer; hence it is to this form of agriculture that the aid of science is indispensable. Indeed, it is fair to say that it has only come into existence since the creation of a science of agriculture. Even at the present time, however, it would not be correct to say that intensive farming is the *best* form of agriculture. Farming is, after all, an industry in which success can only be measured by the profit earned, and if intensive agriculture can claim that the land is put to the best use and made to yield a maximum amount of food for the people, on the other hand extensive farming as practised in the newer countries can equally claim to yield the greatest amount of produce per man employed in tilling the soil.

The relation of science to agriculture has long been a subject of discussion, and is still liable to considerable misapprehension. In the first place, farming is primarily a business, the success of which is to be measured by its personal profit, and no amount of scientific knowledge will make up for lack of skill in marketing or of that mixture of determination and industry which marks the man of business. The farmer may be a most excellent cultivator of the soil or a skilled raiser of stock, and yet fail in buying and selling to the best advantage. Again, the habit of mind which leads to experiments and innovations, in themselves costly, is too often one that insensibly diverts its possessor from the careful pursuit of the routine side of his business. Many of the most valuable improvements in agriculture have been effected by the men who themselves were failures in their business, and this has tended to foster a prejudice in the practical man against any departure from tradition. Moreover, the cultivation of the soil and the management of stock are themselves highly skilled acts which in the older countries are the product of a chain of tradition founded on immemorial experience; science is of comparatively new growth, and has barely assimilated and explained the farmer's instinctive knowledge. Much harm to the cause of science has been done by the rash and short-sighted application of its first discoveries, which could not be otherwise than imperfect approximations to the truth. The growth of a crop or an animal introduces us at once to by far the most complex processes going on in nature; it is indeed the ultimate problem of science, and one that will never be completely solved, because, being the problem of life itself, it is likely to grow more difficult with each advance of knowledge. As soon as he attempts to apply recognised scientific principles to his industry, the farmer is necessarily brought into contact with the whole range of the sciences. The study of the soil necessitates an acquaintance with geology, with meteorology, with physics, and with chemistry; on the other hand, the living organisms that reside there constitute almost a science in themselves. The plant itself brings one in contact with both chemical and botanical problems. Diseases, again, involve the study of fungi and of a large range of the animal kingdom. The nutrition of the animal has both a chemical and physiological aspect, each of them of a most complex character; and veterinary medicine is no less obscure a field of investigation than human medicine itself. Indeed, it is no exaggeration to say that agricultural science draws contributions from every single science, and generally in their most obscure and difficult stages. It is hardly, then, to be wondered at that the early attempts to apply science to agriculture should have resulted in a good many short views and imperfect generalisations, which, however correct in themselves, could not be applied to the actual march of events, because they left out of account other and larger factors that were at work. The growth of a plant, for example, is conditioned by a number of factors, such as the supply of particular foods, the supply of water, the temperature, the light; and these, in their turn, depend upon other processes at work in the soil or in the atmosphere. While it is easy to fix one's attention upon one of these factors and study the manner in which it affects the plant, this factor may never during the whole of the life of the plant become the particular factor determining the magnitude of the crop. For example, plant-food is essential to crop production—hence it is easy to think that the amount of produce will depend upon the manure the crop receives; but if the water-supply be deficient it will be a matter of indifference to the plant how much manure it has at its disposal—the plant will simply grow as far as the available water permits it.

Despite these difficulties, inherent in the subject, the modern farmer must be equipped with some knowledge of science, which, as far as it affects his subject, may be roughly classified as follows: (1) Geological and Physical—the origin of soils, the physical processes relating to the working of soils, and the movements of water therein. (2) Chemical—the materials requisite for the nutrition of plants and their supply in the soil and in manures; the nature of materials present in the plant and the changes they undergo during the nutrition of animals. (3) Botanical—the structure of the habits of cultivated plants and of weeds; plant diseases; the laws of breeding and development of cultivated plants. (4) Zoological—the life-history of various animals affecting plants and live-stock; the laws of heredity. (5) Veterinary Medicine and Hygiene. (6) Economics—book-keeping and cost of production, capital and labour required; marketing and distribution.

Amid all this complexity we may pretty clearly discern that the improvement of agriculture in the future is likely to follow the three main lines which have marked its history in the past. In the first place comes the improvement in the cultivation of the soil. Not only is the land more effectually worked, but by new implements and more skilful application of power the work is being done with increased speed and cheapness. Small's plough (see PLOUGH) represented a perfecting of the tool of immemorial antiquity whereby the soil was thoroughly turned over. The later improvements have all been in the direction of speed, which has, in its turn, dictated the substitution of horses for oxen, the

setting of the man to ride instead of to walk, the increase in the number of shares, and the use of steam or the internal combustion engines for traction. Just as in the same way the path of progress has been from the sickle to the scythe and cradle, to the reaping-machine, to the self-binder, and to the enormous American machines which cut and thrash great breadths at the same time; speed and the saving of human labour have always been the desiderata. Secondly comes the increase of production by the introduction of better varieties of crops and stock. Enormous as the advance has been from the large seeded grass brought into cultivation by primitive man to the modern wheat-plant, we can still see the possibility of equally great steps of the same kind in the future. Thirdly come the materials used in nutrition. The last word has not been said concerning our artificial fertilisers until we have learnt to get the whole of them back from the land in the crop. Lastly we may place the treatment of diseases both in plants and animals. At the present time disease not only takes a heavy toll from our crops and stock, but prevents production being raised beyond a certain point, for increased susceptibility to disease always attends larger crops and more heavy stocking.

History of Agriculture.—More than with any other art the history of agriculture goes back before the dawn of any record, and its early stages must remain for ever irrecoverable. We find the Romans in possession of an elaborate and effective system, and though to a large extent it perished in the dark ages, the tradition must have continued in many obscure places, and eventually reached us in those improvements which we began to adopt from the Continent in the 14th, 15th, and 16th centuries. The early history of agriculture in the British Islands began with the immemorial system which was common to all Teutonic countries. The land was divided into a series of manors or village communities, each of which was practically self-supporting, possessing its own food and clothing, and having but little trade or intercourse with its neighbours. Putting aside the scheme of tenures that grew up with the feudal system and the position of the lord of the manor, whose land was after all farmed in the same manner as that of his tenants, we may describe medieval agriculture as tillage on the open-field plan by an association of agricultural partners. It is thus described by Mr R. E. Prothero: 'The land of the village farm consisted of meadow, arable land, and pasture. If an open-field farm in Wiltshire be taken as an example, it will be found that in shape it was generally long, narrow, and oblong, hemmed in between the downs and the stream, and often stretching three miles in length. At one end stood the cluster of mud-built, straw-thatched cottages, each with its yard, or small pasture for horses, calves, or field-oxen. Sometimes these yards, or "garstons," were common to all the village tenants for rearing stock or for the oxen which could not "endure his warke to labour all daye, and then to be put to the commons or before the herdsman." In these enclosures, or "happy garstons," as they were called at Aston Boges in Oxfordshire, were held the village merrymakings.'

In the lowest part of the land, if possible along the banks of the stream, lay the permanent meadows, or 'ings,' as they were often called. These meadows were fenced off in strips, and balloted for by the tenants, and held in separate ownership from Candlemas or from Lady-day to midsummer or hay-harvest. As soon as the grass was mown and the hay carried, the meadows once more became open common pasturage, and so remained till they were once more allotted and put up for hay.

Beyond the meadows, and running up into the downs till the soil was too poor and steep for the plough, lay the three great tillage fields. Each year one of these bare, hedgeless fields was sown with wheat or rye, or with a mixture of the two called 'maslin;' another was sown with barley, oats, beans, or pease; the third lay fallow. In this unvarying triennial succession the arable land was tilled and cropped. Each of the three fields was cut up into acre or half-acre strips, divided from each other by narrow, rough, bush-grown balks of unploughed turf. The complete holding of each village was so distributed that each man had a third of his holding in each of the three fields, and the three bundles of strips did not lie contiguously, but were so separated and intermixed that the good and the bad land was evenly distributed. Thus, suppose John Doe to hold eighteen acres of arable land, he would each year have six acres under wheat and rye; six acres under barley, oats, beans, or pease; and six acres fallow; and each of the bundle of strips would be so scattered that the tenant received his due proportion of the best and the worst soil. After the crops were cleared, common rights revived, and the cattle of the village wandered promiscuously over the whole.

Beyond the meadows and the tillage lay the poorest and roughest land, which was left uncleared, affording in its native wildness mast and acorns for the swine; rough pasture for the ordinary stock; timber for building, fencing, and fuel; rushes, reeds, and heather for thatches, ropes, baskets, beds, candles, and a variety of other uses in the farm or the house. In these directions also lay the cow-downs and the sheep-pastures. The herdsman and the shepherd were employed by the villagers to take care of their flock and herd. The rams and bulls were the property of the parish. Sheep were valued more for their wool than their mutton, and cows were chiefly kept for milk, breeding, or draught purposes. The common shepherd drives the sheep of the commoners to the downs, or folds them in the common folds upon the arable land, or, when they require to be fed, pens and feeds them in separate lots, each commoner supplying the food for his flock. On the cow-downs the common herdsman tends the cattle of the community. They begin to feed there in May, and continue to graze the downs till after the hay-harvest and after the arable fields are cleared of their crops. In the height of summer they feed in the small marshes by the river, or along the sides of the lanes, or tethered on the turf-balks, and are only driven to the cow-downs after the evening milking. In the late summer they are turned in upon the aftermath of the hay-meadows, the haulm of the beans and pease, the stubble of the wheat, rye, oats, and barley. No winter keep was known to the open-field farmer. He turned a deaf ear, as has been said, to the suggestions of book-agriculturists. Consequently it was only at the wane of the summer that his cattle were more than skin and bone. From Michaelmas onwards they steadily declined in condition, and only survived the winter in a state of semi-starvation. The roast-beef of Old England, for the enormous majority of the population, consisted of the worn-out oxen or the aged cows that were slaughtered in the autumn, when at their fattest, and salted for winter consumption. 'For Easter at Martynmas hang up a beef' is the advice of Tusser.

Such was the system in which the greater part of the cultivated land of the country was tilled in the 17th and 18th centuries. The defects of it are sufficiently obvious. Unless the whole body of farmers agreed together, no individual could move hand or foot. It would be financial ruin

for any member of the community to grow turnips or clover for the benefit of his neighbours. No winter crops could be grown so long as the arable fields were subjected to common rights of pasture. The land was wasted in innumerable footpaths and balks. The strips were too narrow to admit of cross-harrowing or cross-ploughing. Farmers spent the whole day in visiting the different parcels of which their holdings were composed, and their expenses in reaping and carting were immensely increased by the remoteness of the different strips. Drainage was impossible, for if one man drained his land or scoured his courses, his neighbour blocked his outfalls. Consequently the arable land was rarely cleaned; it was choked with docks and thistles, overrun with nettles and rushes, pitted with wet places, pimpled with ant-hills and mole-heaps. Litigation was perpetual when it was so easy for men to plough up the common balks or headlands, remove their neighbours' landmarks or poach their land by a turn of the plough, or filch their crops when reaping. As long ago as Piers Plowman there had been complaints against reapers reaping their neighbours' ground, and in Robert de Brunne's *Handlyng Sinne* there is a reference to the false 'husbands' that 'ere aweye falsely mennys landys.' The manure of the live-stock of the village was wasted by the immense area over which the animals travelled. The promiscuous herding of the sheep and cattle generated every sort of infectious disorder. The scab was rarely absent from the common fold, or the rot from the ill-drained field. No individual owner could improve his own live-stock when all the half-starved, diseased cattle and sheep of the village were crowded together on the same commons. Moreover, from the productive point of view, the wastes and commons were a standing reproach to the rural economy of the country, and were capable of being turned to more profitable account in the hands of enterprising individuals than under the common control of a large body of ignorant, prejudiced, and suspicious copartners.

The general description which has been given applies to almost every part of the country. Scotland formed no exception to the rule. Scottish farmers, who are now reckoned among the most skilful, were in 1689 inferior to those of England, and their methods of raising crops had remained unchanged since the battle of Bannockburn. Alexander Garden of Troup describes the system which was followed in 1686. The land was divided into infield and outfield. The infield was kept 'constantly under corne and bear, the husbandman dunging it every thrie years, and, for his pains, if he reap the fourth corne he is satisfied.' The outfield was allowed to grow green with weeds and thistles, and after four or five years of this repose, was twice ploughed and sown with corn. Three crops were taken in succession, and then, when the soil was too exhausted to repay seed and labour, it reverted to its thistles and weeds.

Under such a system no real improvement was possible; and although we find that Sir Richard Weston, who had been ambassador in the Palatinate in the time of Charles I., grew turnips and artificial grasses on his farm at Sutton in Surrey, their inclusion in the agriculture of the country could only take place when the open fields were broken up and the manors were enclosed so as to give each tenant a piece of land under his permanent control.

The change from the open-field system began as the country emerged from medieval times under the Tudor sovereigns. We find enclosures taking place freely, and the process was renewed with great vigour as soon as the Civil War was over. Early in the 18th century we find from the writings of William Ellis that a great part of Hertfordshire was already being farmed on very much the same system as prevails to-day. The process, however, was far from complete, and it was not until the growth of the manufacturing population increased the demand for food, especially aided by the great rise in prices of all produce attending the Napoleonic wars, that the land of Great Britain was finally thrown into its present form of holding. During the reign of George III. no less than 6,300,000 acres were enclosed, and from the writings of Arthur Young we see that enclosure was still regarded as the necessary first step towards improving the general agriculture of the country. The gain to the nation at large was undoubted. Intensive agriculture became possible, and the production of food for the rapidly growing population was enormously increased, the landlord obtained rents which were undreamt of before, and the farmer became a rich and prosperous element of the community. There is, however, another side to the question. The small common field farmer was in many cases crushed out of existence, and either sank down into the position of a labourer or was driven into the towns. The population residing upon the land became greatly reduced, and the rural labourer in the early years of the 19th century sank into a position of poverty and absolute dependence upon his master which existed in no other walk of life. From this physical and moral depression of one of the most important elements in the community we have as yet hardly recovered; indeed, the effort which is now being made to recreate a number of small holdings only represents an attempt to repair the measure of injustice and mischief which was incidentally effected by the enclosures.

From the time of the enclosures, however, agricultural improvement began. Many of the soldiers who fought in the Low Countries during the religious wars from the time of Elizabeth to Charles II. brought back with them to Britain the methods, the crops, and the stock which they had seen in that highly cultivated country. During the 17th century we have a number of books, like Blith's *English Improver Improved* (1652) and *Samuel Hartlib his Legacie* (1651), giving an account of these improved practices and indicating the path of progress. It is with the 18th century, however, that we really begin to see modern systems of farming emerge, and the man who above all others we may call their founder is Jethro Tull, who, born in 1674 and educated in Oxford, then made a tour of the Continent, noting everywhere the methods of agriculture. From 1700 to 1740 he farmed in Berkshire, experimenting in all kinds of ways on the cultivation of the soil, as a result of which he invented his system of drilling and horse-hoeing. In his *Horse Hoeing Husbandry*, published in 1733, he laid down the principles of cultivation in masterly fashion; and all subsequent works, both scientific and practical, have done little more than confirm and explain the methods which Tull then expounded. Tull's demonstration of the value of turnips and of sowing in drills that permit of cultivation between the rows was, however, long in gaining acceptance amongst the working farmers; it was only the example of a number of great landlords that really drove home Tull's lessons. Of these men Lord Townshend merits the first place. He retired from politics to his estate of Rainham in Norfolk in 1730, and there he devoted himself to the improvement of farming. He marled his light land, he grew turnips whereby to make manure for the corn, and if not the inventor, he was the man who promulgated and made the agricultural community realise the value of that fundamental rotation which we are accustomed to call the

'Norfolk Four-course System.' Other men, like Lord Ducie and Lord Halifax, worked on the same lines; and in Scotland, under Lord Cathcart and Mr Hope of Rankeillor, the Scottish Society of Improvers in the Knowledge of Agriculture was founded. In 1723 this society leased an extensive morass on the south side of Edinburgh, and there demonstrated the value of enclosure, draining, liming, and fallowing; showing also the Scottish farmer what could be done with clover and sown grasses. Closely following these improvements in cultivation of crops came the improvement of stock, and here John Bakewell of Dishley, Leicester, is the father of the modern pure-bred herd. Before his time different parts of the country did possess various types of cattle and sheep, but breeding was promiscuous, the sheep were valued for their wool alone, and the standard in cattle may be gauged by the Lincolnshire ox that was exhibited all over the country—'nineteen hands high, and four yards long from his face to his rump.' Bakewell began his work about the middle of the 18th century, and in a very short time made himself famous, so that visitors came from all parts of the world to see his farm. He began his work with the local breed of sheep, probably crossed them with the white-faced, hornless Ryland because of its peculiarly fine fleece, and by careful selection of rams, and then by inter-breeding amongst those animals only which conformed to the ideal he had in his mind, with astonishing rapidity he produced a uniform flock of a value hitherto undreamt of. His object was not only to secure uniformity but animals which had the most flesh on the best joints and which would rapidly grow into maturity. In fact, all the desiderata of the modern breeder—fineness of bone, early maturity, a compact and symmetrical carcass, a fine and even fleece—were attained in Bakewell's new Leicesters. His work was at once appreciated; in 1755 Bakewell let rams at sixteen shillings each for the season; in 1789 a society paid him 1600 guineas for the hire of his rams for the season. Not only did Bakewell's work create the modern Leicesters, but in their turn the Leicesters have communicated their good qualities to most of our modern breeds of sheep, and again his principles of breeding have been taken up by other men and applied to their own local races. As a cattle-breeder Bakewell was less permanently successful, because the Longhorns upon which he worked did not seem to possess the same innate capacity for improvement. It was Charles Colling (1751–1836), working upon Bakewell's lines with the local cattle of Tees-side, who created the modern Durhams or Shorthorns.

Though the actual improvements in agriculture in the 18th century were due either to tenants like Bakewell, Colling, Ellman, or to men unconnected with agriculture, like Small, who improved the plough, and Meikle, who invented the first thrashing-machine, it was the example of the great landlords that more than anything else spread a better system of farming. Of these men the most famous is Coke of Holkham in Norfolk, who created a fertile estate out of a waste by methods like those of Townshend. In 1778 he began those famous gatherings of farmers known as the 'Holkham Sheep Shearings,' at which men from all parts of the country, indeed all parts of the world, met in the morning to see the farming and the sheep, and then proceeded to a great lunch and an afternoon of toasts and speeches. Similar gatherings were held at Woburn by the then Duke of Bedford, one of the most ardent of improvers, and by the enthusiasm thus generated the practice of the best farmers began to be spread all over the country. In Scotland Lord Kames played a similar leading part, and out of the work of the Scottish Improvers and his example came the foundation of the Highland Society in 1784. But amongst the prophets of modern farming the first place must be given to Arthur Young, who, born in 1741, spent a long and active life travelling both over the British Islands and through France, visiting everything in the nature of an improvement, and writing with singular force and lucidity about what he had seen. As a farmer Young failed more than once; no man can live by trying all the improvements at once, but he really knew his farming from top to bottom, and as an agricultural writer is never likely to be matched. The influence he had obtained by his *Annals of Agriculture* (1784–1809) and his *Tours* (1768–89) was only increased when he was made secretary of the newly founded Board of Agriculture in 1793, and from this time to his death in 1820 he continued to press untiringly the adoption of enclosures, the system of drilling and horse-hoeing, and the introduction of the improved breeds of stock. The epoch of high prices which had helped so much towards the revolution of British farming came to an abrupt close with the end of the Napoleonic wars in 1815. Prices fell with a crash; rents had to be reduced, though not rapidly enough to save many farmers from ruin; above all things, the small yeoman was crushed out of existence at this time because he had borrowed money on the strength of the continuance of the old prosperity. The crash, however disastrous it seemed at the time, was probably beneficial to the industry. Men went more carefully to work, and as the industrial population of the country was increasing by leaps and bounds, the demand for agricultural produce grew year by year, prices began to rise again, and a new epoch of prosperity rapidly set in. From 1830 onwards the great landlords of the country were still set on improving their estates and raising the status of farming. With the foundation of the Royal Agricultural Society of England in 1838, a society which really grew out of the old Board of Agriculture that had ceased to exist in 1822, we see the enlightened interest which many of the landowners of the country were taking in farming. At this period, too, began the introduction of artificial fertilisers and foreign feeding-stuffs. Nitrate of soda and guano began to come to the country about 1840, in 1842 Lawes took out his patent for superphosphate, and in a very few years all the farmers in the country were growing their turnips with the aid of these new manures. It was the introduction of this extraneous source of fertility which above all other things increased the productive power of England's land. Lawes estimated the average crop of wheat in his district at about twenty bushels at the time he began his farming; it had certainly become thirty bushels in the next twenty years, and this in the main had been rendered possible by the new sources of fertility. From 1840 to 1872 agriculture was continually prosperous; not only was the art of crop-raising brought to its highest pitch of refinement on the great farms of the Lothians, but all our present breeds of cattle and sheep took shape, and were improved and reduced to uniformity along the lines laid down by Bakewell for his Leicesters. Britain began to send her pedigree-stock all over the world, and the Shorthorn, the Hereford, and the Devon founded great herds in America, Australia, New Zealand, and later in the Argentine. In the late 'seventies a change began; American competition was beginning to make itself felt until prices both of wheat and beef were set by the importations and not by the home productions; finally a succession of wet seasons and bad harvests, culminating in the disastrous summer of 1879, worked havoc amongst the arable farmers. During the 'eighties things grew steadily worse; in too many cases landlords mistook a

permanent change in the agricultural conditions for a temporary depression, rents were not reduced until the tenants were ruined, and on the strong land in the east of England many farms for a time could find no tenants at all, but sank down in a derelict state, until they had become covered with a miserable vegetation of grass and weeds. It was the arable farmers who were chiefly hit by this depression, especially the men on the strong lands in the east of England; graziers in the midlands and the west suffered less because meat and particularly milk maintained their values. The year 1894 saw about the lowest level of prices, and since that time agriculture has been entering upon a slow but steady period of prosperity. The great readjustment of rents has taken place, cheaper methods of cultivation have been learnt, and if something of the old finish has departed from British farming, the methods are more business-like, and better advantage is being taken of the resources which science has put at the disposal of the farmer. Above all things, prices have been steadily rising, and with the enormously increased output of gold seem likely to be maintained for some little time.

Agricultural Education.—The preparation of the modern farmer for his future career involves, or should involve as a matter of course, some systematic education in the principles of agriculture, but how far that course should extend must still to a large extent depend upon the size of the holding and the style of farming which is within the reach of the young man in question. The farmer who is likely to have some command of capital, so as to be able to become a tenant of a farm of two to five hundred acres, may profitably go through a regular college course extending over three years; but the smaller farmer will probably derive a greater benefit by attending short courses of instruction during several successive winters, while in the summer he works on his father's farm. The education of this class of farmer is also provided for in some districts by farm schools, which take boys at the age of fourteen or fifteen and give them a certain amount of practical and scientific instruction while continuing their general education. At the present time Great Britain is fairly well provided with colleges giving a higher form of instruction, but an adequate supply of winter courses of instruction and farming schools for the smaller farmers has hardly as yet been organised.

Systematic agricultural education in Great Britain may be said to have begun in 1890, when the so-called 'whisky money' was handed over to the county councils to be spent on technical education. Out of these funds many counties, acting either singly or in groups, established agricultural colleges or subsidised agricultural departments at the nearest university, and in this policy they were assisted by the Board of Agriculture, which in 1888 was given a grant from the Treasury for the encouragement of agricultural colleges and dairy schools. In the year 1910–11 the Board of Agriculture made grants (annual) to twenty institutions in England and Wales, amounting in all to £18,840. In Scotland similar work is under the charge of the new Board of Agriculture, which subsidises the three agricultural colleges at Edinburgh, Glasgow, and Aberdeen. In Ireland the work is organised and supported by the Department of Agriculture and Technical Instruction. More recently the Development Commission has made considerable grants to the agricultural colleges for capital purposes, and also an annual grant to enable them to provide technical advice for the farmers within the area which they serve. A considerable sum has also been set aside for the extension of secondary education in agriculture. The following list shows in brief the provisions now made for agricultural instruction in the United Kingdom.

In Scotland, the East of Scotland Agricultural College, the West of Scotland Agricultural College, and the North of Scotland Agricultural College are attached to the respective universities of Edinburgh, Glasgow, and Aberdeen. Each provides a full course of agricultural instruction extending over three years and leading to the university degree of B.Sc.; each also provides a shorter diploma course of instruction and winter courses of short duration for men already engaged in farming. These colleges also provide courses of lectures and other forms of itinerant instruction in the various counties in the three areas into which Scotland has been divided for educational purposes, a resident lecturer being posted in each county, who not only gives lectures in the winter, but conducts field experiments and demonstrations during the summer months.

The University of Edinburgh was the first to institute a degree in agriculture in 1886. It is still the only one of the Scottish universities which accords full professorial rank to a teacher of agriculture. This professorship was, indeed, founded and endowed in 1790, a few years earlier than the creation of the Sibthorpian professorship at Oxford, which, further, was so poorly endowed that it has only become effective and acquired a resident holder during the last few years. At Oxford this re-endowment of the Sibthorpian professorship has been accompanied by the formation of a school of rural economy, and agriculture has now become one of the final subjects by which a student may proceed to his degree. At the University of Cambridge a school of agriculture has been at work for some time, and professorships both of agriculture and agricultural botany have been established within the university, together with readerships in agriculture and agricultural zoology. The university awards a diploma which is open to others than members of the university, while certain agricultural subjects may also be offered towards the ordinary degree.

The Armstrong College at Newcastle-on-Tyne is associated with the University of Durham, and provides instruction leading up to the degree of B.Sc., and also to a college diploma. It possesses a farm and experiment station at Cockle Park, Alnwick, and conducts experiments and gives lectures in the three northern counties. The University of Leeds provides a course leading up to the B.Sc. degree. The college farm and experiment station is situated at Garforth. The University of London also provides an examination for the degree of B.Sc., and this may be taken by external students as well as by the students of the South-east College at Wye, which is one of the constituent colleges of the university. The college at Wye also provides other courses of instruction leading up to the college diploma and certificate. The Cheshire Agricultural College at Holmes Chapel has recently been affiliated to the University of Manchester, where provision is now being made for granting the degree of B.Sc. in agriculture. In England there are also colleges which are not directly connected with any university conferring the degree. Of these the oldest is the Royal Agricultural College at Cirencester, which was founded in 1845, and has recently been reorganised and brought into connection with the local county councils and with the University of Bristol. The Midland Agricultural and Dairy College at Kingston, Notts, provides a general agricultural course leading to a diploma, as well as a special course of dairy instruction. The Harper Adams Agricultural College at Newport, Salop, provides a course of instruction leading up to a diploma; as also does the Agricultural Department of the

University College, Reading, where, further, the British Dairy Farmers' Institution provides systematic instruction in dairy-work. In addition to these, long courses of agricultural education are provided at the Harris Institution, Preston, and the Agricultural College, Uckfield, Sussex. The Essex County Laboratory at Chelmsford provides short courses of instruction; while there are farm schools, at Penrith belonging to Cumberland and Westmorland, at Basing belonging to the Hampshire County Council, and at Ridgemont belonging to the Bedfordshire County Council.

In Wales the University Colleges at Bangor and Aberystwith provide full courses of instruction leading to the degree of B.Sc. of the University of Wales. In Ireland agricultural education is in the hands of the Department of Agricultural and Technical Instruction, who provide a full course of training at the Royal College of Science, Dublin, in connection with the Albert Agricultural College at Glasnevin.

It is a matter of considerable debate whether in the education of a farmer a course at an agricultural college should precede or follow residence upon a farm in order to acquire the indispensable practical acquaintance with the working conditions of the industry. Probably for the sons of farmers who already know a good deal about life upon a farm the best plan is to take the college course immediately on leaving school; but in the case of boys coming out of a town the preliminary residence of a season upon a farm is desirable before they go to a college, in order to give a student some general acquaintance with farming matters. Such a student should also join a farm as a pupil after the completion of his college course. See Report of the Departmental Committee appointed by the Board of Agriculture to inquire into the subject of Agricultural Education in England and Wales (1908).

Agricultural Research.—Although agricultural research has never received in this country the attention that has been paid to it in many Continental states and in America, the United Kingdom possesses the oldest of all agricultural stations, and one that has done the most to lay the foundations of agricultural science. The Rothamsted Experimental Station was founded by the late Sir John Lawes in 1843, in which year he obtained the assistance of the late Sir J. H. Gilbert, in order to put upon a systematic basis certain experiments which he had already begun to carry out upon his estate at Rothamsted, near St Albans, Herts. For many years Lawes carried on the experiments entirely at his own expense and under his own control, and in 1889 he created the Lawes Agricultural Trust, endowing it with stock to the value of £100,000. The laboratory and the lease of the land upon which the experimental plots are situated he entrusted to the management of a committee composed of four members nominated by the Royal Society, two by the Royal Agricultural Society, and one each by the Chemical and Linnean Societies and the owner of Rothamsted.

At Rothamsted field experiments have been carried out on a large scale to ascertain the manurial requirements of the various farm crops, and their yield under various conditions. The distinguishing feature has been the continuity of plan; each particular plot has always carried from year to year the same crop, and has received similar treatment and manuring. The accidental errors due to variations of soil and season, which are inherent in all field experiments, are thus eliminated, and the effect of the treatment stands out clearly. From such results over a series of years the influence of different types of season can be ascertained; and in the course of time the secondary effects of the treatment on the composition and behaviour of the soil also become apparent; exhaustion of the soil in particular directions manifests itself by degrees. The effect of the manures used on the gross yield of the crops may be regarded as settled by these experiments; indeed the results are nowadays incorporated into the current tradition of the practical farmer; but the effects produced upon the soil and upon the quality of the crop are still matters which urgently require investigation, for which the Rothamsted plots provide unique material.

While field experiments with farm crops have always been the main subject for investigation at Rothamsted, many other cognate matters have been dealt with. For a long time feeding experiments were conducted with cattle, sheep, and pigs, in the course of which analyses were made of the whole bodies of these animals in various stages of fatness. These experiments still form the basis of our knowledge of the composition of the animal body. Other experiments have dealt with the nature and amount of food required by the fattening animal, and with the relation of food to work and the source of fat in the body; all of these have assisted in laying the foundations of the theory of animal nutrition. More directly practical inquiries have dealt with the value of malt as food, with the utilisation of sewage and the feeding value of sewage-grown grass, and with the making and feeding value of ensilage.

The investigations on the soil have been continuous, and have related chiefly to the manner in which it gains or loses fertility, including a detailed examination of the substances removed in the water draining through arable land. Mr Warington, when working in the Rothamsted Laboratory, determined the conditions under which the nitrates, upon which nearly all plants depend for their nitrogen-supply, are formed or destroyed in the soil by bacteria. Much information has also been accumulated on the action of the bacteria, either associated with leguminous plants or living free in the soil, that fix the atmospheric nitrogen and so gain fertility for the farm.

In 1899 the papers in which the results of the Rothamsted work were embodied were collected, forming three 4to and 8vo volumes, sets of which were distributed by Sir John Lawes to the chief libraries, colleges of agriculture, and experiment stations in the world. A more general summary of the work done is contained in the *Book of the Rothamsted Experiments*, published by J. Murray (1905; price 10s. 6d. net). *The Guide* to the Rothamsted experiments shows the current conditions of cropping and yield.

In 1876 the Royal Agricultural Society began experiments on a farm at Woburn which was provided by the Duke of Bedford. Since that time experimental plots dealing with wheat and barley on similar lines to the plots at Rothamsted have been maintained on its light, sandy soil; and a number of other experiments both on crops and animals are also being carried out under the supervision of the society's chemist, Dr J. A. Voelcker. The Highland and Agricultural Society have also conducted a long series of agricultural experiments both on a permanent station which they for some time held at Pumpherston, and on a more extensive scale by the co-operation of farmers in different parts of the country. The Bath and West of England Society has also conducted a number of similar experiments by co-operation of farmers in the south and west of England. Of recent years the establishment of a number of agricultural colleges has added to the agricultural research done in this country. Mention may particularly be made of the extensive investigations conducted

by the Agricultural Department at Cambridge on the experimental breeding of cereals, which have already resulted in the production of several new varieties of wheat and barley which promise to be superior to any that are at present at the disposal of the farmer. The Irish Department of Agriculture does not possess any special agricultural station, but has conducted a large number of experiments by co-operation with farmers. Among these may be particularly noticed an extensive series of tests on varieties of barley, and trials of early potato-growing which have already established this industry on suitable soils in the south of Ireland, together with trials of tobacco and flax. In 1911 the much-needed extension of agricultural research in the United Kingdom was inaugurated by the action of the Development Commission, which has set aside a sum of about £40,000 annually for the foundation of research institutes dealing with the main branches of the subject and the encouragement of agricultural investigations in the universities and colleges.

Agriculture in the United Kingdom.—The characteristic feature of agriculture in Great Britain is that it is for the most part carried on by tenant-farmers holding comparatively large farms for which they pay a fixed rent and which they work with their own capital. At one time it was customary to hold these farms on a sufficiently long lease to give the tenant a prospect of recovering his expenditure on improvements of a more or less permanent character, but since the great depression yearly tenancies have been much more general. By custom the landlord is called upon to execute repairs to the buildings and make other outlays of a capital nature, while the various Agricultural Holdings Acts give the tenant security of compensation for other improvements he may have executed during his tenancy. By the custom of the country which has become legalised by the Agricultural Holdings Act, the incoming tenant or the landlord pays to the outgoing tenant a valuation to represent the standing crops and the work which has been done upon the land for which the outgoing tenant has received no return, together with the unexhausted value of fertilisers and feeding-stuffs consumed upon the farm. Compensation must also be paid for such improvements as laying upon land the grass, drainage, and additional buildings, provided the improvements have been made with the consent of the landlord. This system, which gives the tenant the responsibility for the management of the farm, has undoubtedly done much to bring British agriculture into its high position, because it has held out sufficient hopes of return to keep men of capital in the business of farming, and has thus led to intensive farming and a high standard of the utilisation of the land. Cumbrous as the system may appear to be, it has in a general way worked extremely well, and has only led to difficulties where the tenant has taken up special crops and departed widely from the normal routine of farming, so that it becomes difficult to apply the usual customs of compensation at the close of the tenancy.

Owing to its greater rainfall the western side of Great Britain contains a greater proportion of grass-land than the eastern. At the present time arable land as the leading feature of the farming is mainly confined to the south of England and to the belt which stretches up the east coast as far as Aberdeen. In the south-west of England grazing predominates, the production of milk, butter, and cheese, and the raising of cattle, being the dominant features of the industry. In Cornwall there is also fertile arable land close to the sea which is highly valued for the production of early vegetable crops. In Somerset, again, there is a small area of exceptionally good arable land on which barley of very high quality is produced. Orcharding and the making of cider form also a notable feature in the agriculture of Devon and Somerset. Dorsetshire is largely a dairy county, but the chalk uplands of Wiltshire, Hampshire, and west Sussex are largely under the plough. Raising of sheep forms a prime feature in this farming, the sheep being folded on the arable land for the greater part of their life. Kent, and with it part of east Sussex, is characterised by highly specialised systems of farming, in which the production of fruit and of hops plays a very prominent part. The heavy lands of Essex have of late years been largely given up to milk-raising. In Norfolk and Suffolk the grass-land is of little moment, and corn-growing, with bullock-fattening, forms the mainstay of the farming. In the fen country the growing of corn and potatoes and the raising of heavy horses are characteristic features of the farming. Intensive potato-growing is also to be seen on the warp soils of Lincolnshire, while on the wolds arable farming and sheep are prominent. The midlands of England are largely occupied by heavy clay soils derived from the Lias and other clay bodies of the Jurassic formations. This land is mostly in grass and forms the great milk-producing area of England, while on the better land a certain amount of bullock-fattening is carried on. In the west midlands, Worcestershire, Herefordshire, and Gloucestershire, fruit-growing becomes the leading industry, and in this area hops again become prominent on the good lands in the river valleys. This country joins on to a well-managed and often very fertile district, of which Shropshire is the centre, where mixed farming is comparatively prevalent, and the raising of sheep and cattle a valuable item in the industry. In Cheshire dairy-farming and the raising of potatoes are general, as also along the western border of Lancashire, specially in the Fylde district north of the Ribble. In these two counties the farms are generally comparatively small, and are maintained at a high pitch of cultivation. Yorkshire, again, presents some fine farming country with very distinct types of soil in the Vales, the Wolds, and the alluvial area of Holderness respectively. Mixed farming of a most varied type prevails ; perhaps the raising of light horses constitutes its most distinctive feature. Along the sea-border of Durham and Northumberland stretches a belt of comparatively light land highly farmed on a four-course system, the staple products being barley, sheep, and cattle fattened in the stalls. This arable country crosses the border into the notable farming district which extends by Dunbar through the Lothians up to Edinburgh. This district constitutes perhaps the most highly farmed land of the United Kingdom, fat bullocks, sheep, and barley being the chief products, while the potatoes grown on the red soils in the neighbourhood of Dunbar possess a special repute. North of Edinburgh the highly farmed arable country continues through Forfarshire, the Carse of Gowrie, Strathmore, and up the east coast as far as Aberdeen, winter fattening of bullocks being the mainstay of the industry, while barley for the distilleries and oats form the other chief sources of revenue. In the neighbourhood of Blairgowrie an important fruit industry has sprung up of recent years, and a considerable portion of the land is occupied by raspberries and other soft fruits. The south-west of Scotland is mainly given up to the dairy industry, but on the coast of Ayrshire there is an area where the growing of early potatoes forms the most important industry. Cumberland and Westmorland, again, are in the main dairying and stock-raising districts. The more elevated parts of Great Britain are largely given up to the raising of stock which are afterwards sold into the lowlands to be

fattened. Wales possesses several breeds of mountain sheep of considerable repute, and also raises the well-known black runts which are sold into the east of England to be fattened. Dairy produce forms also a feature of the Welsh farming. The uplands of the south of Scotland are chiefly given up to the production of sheep and store cattle, like the Galloways and the well-known blue-gray cross, which travel southward for fattening. The Highlands of Scotland, again, are generally farmed for sheep, but also export considerable numbers of their well-known breed of cattle. In Ireland the agriculture is naturally undergoing considerable changes with the revolutions that are taking place in the system of landholding. For a long time the chief agricultural exports of Ireland have been cattle of a Shorthorn type, which are in great demand all over the midlands and east of England for fattening purposes, and butter, especially from the south and west. Light horses are also raised to a very large extent. The area under arable cultivation is not large, though the average yield per acre is high. In the north of Ireland a considerable, though shrinking, area is devoted to flax.

Agricultural Societies.—Potent factors in agricultural progress have been the agricultural societies which have existed for the last hundred years or more in various parts of the country. By their annual shows they have done much towards the improvement of live-stock, and have greatly forwarded the introduction of new implements; several of them have also been the effective agencies in the spread of education, before the creation of the numerous agricultural colleges which now exist. The societies were also pioneers in the provision of facilities for obtaining analysis of manures, &c., tests of seeds, and other expert information for their members. For a long time they were, again, almost the only agencies carrying on systematic experiments and demonstrations on the use of fertilisers and trials of new varieties of plants. The oldest of the societies is the Highland and Agricultural Society, which dates from 1784, and was incorporated by Royal Charter in 1834. The society had in 1911 about 6500 members, a capital of £111,179, and an income in the same year of £16,043, of which £6229 consisted of receipts from the annual show. The society holds an annual show in different parts of Scotland, publishes an annual journal, gives expert advice by means of its officers to its members, and assists local agricultural associations throughout Scotland. Jointly with the Royal Agricultural Society of England, it conducts examinations in agriculture and in dairying, on which the national diploma in these subjects is granted. The Royal Agricultural Society of England was founded in 1838, and had in 1911 over 10,000 members. Its invested funds amounted to £56,375, and its annual income was £9791, exclusive of all receipts and expenditure connected with the show. It holds an annual show in various parts of England, publishes a journal, provides expert advice on chemical, botanical, zoological, and veterinary matters for its members, and shares in the conduct of the national diploma examinations with the Highland and Agricultural Society. The Bath and West and Southern Counties Society was established in 1777, and has 1200 members. Its funds amounted in 1911 to about £20,100, and its annual income was £11,827, of which £10,114 was in respect of the show. This society also publishes a journal, provides expert advice for its members, and carries on experimental work, especially in connection with dairying and cidermaking. The Royal Dublin Society was founded in 1731, and has 3400 members, with a subscription income of nearly £5000. It holds four shows during the year at Ballsbridge, Dublin, of which the horse show, held in August, has a world-wide reputation. The Central Chamber of Agriculture meets eight times in the year in London, and represents about 20,000 members belonging to the affiliated chambers of agriculture in all parts of the country. Its objects are to watch over all measures affecting agriculture in and out of parliament. The National Farmers' Union was founded in 1908, and consists of representatives of farmers' unions throughout the country, these unions having been founded for the purpose of watching over matters affecting farmers. The distinguishing feature of this society is that no one is eligible as a member unless he is carrying on the business of farmer in actual practice. The Smithfield Club in London was founded in 1798, its object being the holding of an annual fat stock show. Three societies exist for the purpose of promoting co-operation and organising agricultural co-operative societies throughout the kingdom. These are the Irish Agricultural Organisation Society, which was the pioneer in this direction; the Agricultural Organisation Society; and the Scottish Organisation Society. The Farmers' Club (London) was founded in 1842, and has now about 1000 members. It has premises in London, and holds eight meetings during the year for the discussion of agricultural subjects. The British Dairy-Farmers' Association was founded in 1875, and has now about 1000 members. Its objects are the improvement of dairy stock and dairy produce, to which end it publishes an annual journal, holds an annual conference and discussion, and an annual show in London. This society also founded the British Dairy Institute, which is now carried on at Reading in connection with the University College. In addition to these general agricultural societies, almost all the varieties of horses, cattle, sheep, and pigs bred in the United Kingdom are represented by societies, each of which issues an annual stud-book and register of pure-bred stock, and either holds a special show or gives premiums and special prizes at the shows throughout the country. These societies have done much towards improving the breeds and the establishment of an export trade in pedigree stock, which is one of the most notable features in British farming.

Board of Agriculture.—The Board of Agriculture and Fisheries was established in 1849, and deals with the agriculture of Great Britain. It is represented in parliament by its president, and possesses a permanent secretary and staff. To this department were transferred many duties previously administered by the Board of Trade, Privy Council, and the Lands Commissioners. The functions of the department may be considered under five divisions. The animal division is chiefly concerned in the administration of the Diseases of Animals Acts, and possesses, in addition to its central staff, a number of inspectors throughout the kingdom, whose duties consist in the control of such diseases as swine-fever, sheep-scab, &c. To this division is also attached a research department. The land division is charged with the administration of the Small Holdings and Allotments Acts in England and Wales, and deals with applications of landowners to improve and charge their societies under the Improvement of Land and other Acts; with the appointment of arbitrators, &c., under the Agricultural Holdings Acts; and with the sale of glebe land and university and college estates. The statistical division collects and compiles the annual agricultural returns as to the acreage and production of crops, number of live-stock, and prices of agricultural commodities. An annual report is published, which may be obtained from any bookseller. The intelligence division collects and disseminates general information relating to agriculture. It issues a monthly journal and

leaflets from time to time giving advice on special topics. It is charged with the inspection of the agricultural colleges to which the Board gives grants, and all the business arising out of the Sale of Food and Drugs Act, the Fertilisers Act, &c. The Royal Botanical Gardens at Kew and the Ordnance Survey of the United Kingdom are also administered by the Board of Agriculture. The annual expenditure of the Board for the year 1908-9 was £148,124. By the Small Landholders (Scotland) Act of 1911 the duties of the Board of Agriculture in Scotland were transferred to the Scottish Board of Agriculture, which receives an annual grant of £200,000 for the general purposes of the Board and for the acquisition of land for small holdings. The Department of Agriculture and Technical Instruction for Ireland was established in 1899, and exercises for Ireland similar functions to the Board of Agriculture in England. It possesses, further, entire control of the agricultural education in Ireland, and has large powers in carrying out experiments and assisting the improvement of agriculture throughout Ireland. This department is assisted by a council appointed in part by the various councils of Ireland and the Agricultural Board, whose members are nominated by the provincial committees of the agricultural councils. The annual expenditure for the year 1908-9 was £95,561.

Agricultural Statistics.—The agricultural statistics for the United Kingdom are published annually for England, Scotland, and Wales by the Board of Agriculture in four parts, issued by Messrs Wyman and Co., and for Ireland by the Department of Agriculture and Technical Instruction in a single report issued by the same firm. The total area of land and water, with the cultivated area, rough grazings, and woodlands, is given below for each country (in thousands of acres).

	Total Area, Land and Water.	Cultivated Area.	Rough Grazings.	Woodlands.
England....	32,392	24,541	2,416	1,715 *
Wales.....	4,750	2,782	1,324	184 *
Scotland....	19,070	4,860	9,103	868 *
Ireland.....	20,351	17,135	2,470	302

* 1905.

The total area under cultivation has been showing a small but continuous decline for the last fifty years in all the countries except Ireland, this being due to the extension of urban areas, the withdrawals from cultivation having been more or less balanced by the taking in of fresh land from the uncultivated fringe. But the most striking change which has been seen in this period has been the loss of the arable land, with a corresponding increase in the permanent grass. England and Ireland show this change most markedly; in Scotland the area of arable land has been better maintained.

The division of the land and its distribution into various-sized holdings are shown for each country in the following table:

Number of Holdings.				
	England.	Wales.	Scotland.	Ireland.
Over 1 and not over 5 acres..	80,195	10,210	18,053	61,730
Over 5 and not over 50 acres..	165,661	31,945	34,490	364,549
Over 50 and not over 300 acres	109,768	18,004	23,139	81,104 *
Over 300 acres...	14,642	387	2,677	9,513 †
Total....	370,266	60,546	78,359	601,765

* Over 50 and not over 200 acres. † Over 200 acres.

In the following table are set out for the year 1909 the acreage under the principal crops in the four countries; while the next table shows the change that has been taking place in this allocation of the land by a comparison of the areas in 1888, 1898, and 1908 respectively.

	England.	Wales.	Scotland.	Ireland.*
	Acres.	Acres.	Acres.	Acres.
Wheat.....	1,734,236	89,583	49,679	36,677
Barley.....	1,379,133	85,272	199,981	154,442
Oats.....	1,889,912	195,528	943,437	1,060,301
Beans and peas..	484,862	2,090	10,822	2,091
Potatoes.....	405,529	26,994	142,938	587,144
Swedes, mangolds, &c.....	1,653,759	74,820	455,490	421,753
Clover and other rotation grasses	2,383,459	292,636	1,538,480	14,805,182
Permanent grass	13,911,995	2,053,357	1,487,053	
Hops.....	32,589	—	—	—
Flax.....	—	—	—	46,916

* In 1908.

	1888.	1898.	1908.
	Acres.	Acres.	Acres.
Arable Land—			
England.....	12,348,594	11,503,141	10,659,477
Wales.....	902,742	902,945	746,709
Scotland.....	3,686,866	3,511,553	3,389,331
Ireland.....	—	—	—
Permanent Grass—			
England.....	12,615,889	13,254,349	13,900,922
Wales.....	1,938,660	1,923,829	2,040,805
Scotland.....	1,191,648	1,381,214	1,474,142
Ireland.....	—	—	12,506,389 *
Wheat—			
England.....	2,418,674	1,987,385	1,548,732
Wales.....	76,828	58,960	34,573
Scotland.....	68,735	55,861	43,428
Ireland.....	—	52,798	36,677
Hops—			
England.....	58,494	49,735	38,921
Flax—			
Ireland.....	—	34,469	46,916

* See *Agricultural Statistics, Ireland*, p. 2.

In 1909 the live-stock of the country were enumerated as follows:

	England.	Wales.	Scotland.	Ireland.*
Horses used for agricultural purposes.....	879,212	96,795	156,007	374,826
Horses unbroken..	808,658	68,833	48,483	158,546
Cows and heifers..	2,073,440	285,626	435,110	1,586,425
Other cattle.....	3,026,705	459,046	741,055	3,206,038
Breeding ewes....	6,191,525	1,582,187	3,036,764	1,635,470
Other sheep.....	10,303,287	2,213,155	4,291,501	2,490,636
Breeding sows....	268,401	32,857	15,294	123,666
Other pigs.....	1,777,883	171,927	114,525	1,094,174

* 1908.

	1888.	1898.	1908.
	No.	No.	No.
Cows and Heifers—			
England.....	1,765,107	1,872,774	2,046,512
Wales.....	275,081	274,073	285,385
Scotland.....	410,256	440,343	431,883
Ireland.....	1,384,771	1,431,192	1,586,425
Other Cattle—			
England.....	2,587,719	2,801,529	2,951,766
Wales.....	391,178	427,704	447,066
Scotland.....	700,034	805,941	742,522
Ireland.....	—	3,055,747	3,206,038
Breeding Ewes—			
England.....	—*	5,878,162	5,980,125
Wales.....	—*	1,272,959	1,545,507
Scotland.....	—*	2,986,811	3,043,457
Ireland.....	—*	—*	1,635,470
Other Sheep—			
England.....	—*	10,008,376	9,978,750
Wales.....	—*	1,995,749	2,175,853
Scotland.....	—*	4,601,137	4,396,038
Ireland.....	—*	—*	2,490,636

* Not separated into 'breeding ewes' and 'other sheep,' but divided according to age—'under one year old' and 'one year and over.'

The average yield of some of the principal crops for the ten-year period 1899-1908 in the four countries is set out in the following table:

	England.	Wales.	Scotland.	Ireland.
	Bushels.	Bushels.	Bushels.	Bushels.
Wheat	31·39	26·39	38·86	34·41
Barley	32·91	31·09	35·32	40·09
Oats	41·75	34·48	36·60	46·63
Peas	27·39	21·53	26·67	26·88
Beans	29·77	26·56	34·78	41·53
	Tons.	Tons.	Tons.	Tons.
Potatoes	5·83	4·98	6·09	4·37
Turnips and swedes	12·57	14·88	15·55	16·17
Mangolds	19·70	17·40	17·67	18·01
Clover and other rotation grasses	Cwt. 29·64	Cwt. 24·92	Cwt. 32·30	Cwt. 42·77
Permanent grass cut for hay	24·12	19·46	29·72	47·02

In comparing the yield in the United Kingdom with those of other countries the data available are not always sufficient, but are more complete as regards wheat than any other crop. The following table gives the mean yield in bushels per acre up to 1908 for the five previous years, together with the acreage:

	Wheat.		Barley.	
	Mean Area.	Mean Yield per Acre.	Mean Area.	Mean Yield per Acre.
	Acres.	Bushels.	Acres.	Bushels.
United Kingdom	1,664,561	31·53	1,938,933	33·81
Argentina	11,997,298	11·20	—	—
Australia	5,818,541	9·48	101,587	19·63
Austria-Hungary	11,950,297	18·24	5,637,269	22·63
Belgium	382,730	35·19	90,308	48·72
Canada	6,066,450	15·28 *	1,736,779	25·53 *
Denmark	99,880	42·10 *	576,209	40·93 *
France	16,110,110	20·46	1,744,119	22·46
Germany	4,611,438	29·44	4,103,671	33·95
India	27,169,824	11·61	7,310,268	—
Italy	12,086,684	13·09	762,600	10·60
Netherlands	139,198	33·45	76,823	47·41
New Zealand	222,373	33·17	31,007	35·87
Spain	9,060,525	12·31	3,372,763	17·53
Russia	60,624,164	9·68	23,991,494	13·70
United States	46,782,150	13·48	5,601,260	25·64

* 1907 only.

The prices obtained for some of the leading products of the farm are set out in the following table, a comparison being made of the averages obtained in the years 1888, 1898, and 1908:

	1888.	1898.	1908.
	s. d.	s. d.	s. d.
Wheat....per quarter	31 10	34 0	32 0
Barley.... "	27 10	27 2	25 10
Oats..... "	16 9	18 5	17 10
Potatoes.....per ton	—	—	71 1
Meadow hay.. "	—	—	61 6
Beef.....per cwt.	47 5	41 5	50 7
Mutton..... "	59 4	52 1	60 1
Pork..... "	—	—	52 6
Wool.....per lb.	0 9¾	0 8	0 8½

As the imports of foreign produce have such a dominating effect upon the prices obtained by the British farmer, in the following table are set out the quantities imported in the years 1888, 1898, and 1908 of the chief articles entering into competition with British produce:

	1888.	1898.	1908.
Wheat.....cwt.	57,261,363	65,227,930	91,131,205
Flour..... "	16,910,442	21,017,109	12,969,855
Barley..... "	21,305,350	24,457,004	18,137,200
Oats..... "	18,770,686	15,577,900	14,269,250
Beef..... "	1,063,602	3,591,110	5,997,964
Mutton..... "	988,010	3,432,315	4,450,877
Pig-meat..... "	4,083,565	8,517,216	7,753,799
Live cattle...number	377,088	569,066	383,129
Live sheep... "	956,210	663,747	78,900
Live pigs.... "	24,509	450	—
Butter.....cwt.	1,671,433	3,209,153	4,210,831
Cheese..... "	1,917,616	2,339,452	2,306,086
Eggs.....thousands	1,126,793	1,730,952	2,185,208
Wool*.....lb.	300,192,492	416,237,300	397,508,149
Hay.....tons	—	116,107	42,321

* The gross imports are 1½ to 1¾ times more than here given.

The following table gives the imports of feeding-stuffs not grown in the United Kingdom, and of substances used directly and indirectly as manures:

	1888.	1898.	1908.
Maize.....cwt.	25,370,164	57,169,292	33,841,000
Linseed.....quarters	2,533,540	3,688,515	2,067,195
Linseed-cake.....tons	257,748 *	220,352	123,168
Cotton-seed..... "	257,172	430,432	616,923
Cotton-seed cake... "	—	158,672	165,050
Rape-seed.....quarters	—	258,951	147,490
Bones.....tons	66,166	59,406	41,412
Guano..... "	24,432	23,644	34,417
Nitrate of soda..... "	102,664	130,327	145,724
Phosphate of lime.. "	257,886	330,610	529,135

* Oilcake.

The articles on the several countries contain sections on their agriculture; see especially those on the United States, Canada, Australia, New Zealand, and Argentina. There are articles on Anthrax, Rinderpest, Murrain, Pleuro, and the other animal diseases; on Wheat, Barley, Oats, Grasses, Pasture, Bean, Beet, Carrot, Cabbage, Clover, Hops, Lucerne, Maize, Mangold-wurzel, Potato, Turnip, Vetch, and the diseases that attack them; on Allotments and Peasant-proprietorship, and many other agricultural articles, such as:

Butter.	Farm.	Manure.	Sheep.
Cattle.	Fodder.	Nitrification.	Soils.
Cheese.	Guano.	Parasitic Animals.	Thrashing.
Cream.	Hay.	Pig.	Physiology (Vegetable).
Dairy.	Horse.	Plough.	Veterinary Medicine.
Drainage.	Irrigation.	Poultry.	Waste Lands.
Ensilage.	Land Laws.	Reaping.	
Fallow.	Landlord.	Rotation.	

See Fream's *Elements of Agriculture*, enlarged by Ainsworth-Davies (5th ed. 1905); Stephens's *Book of the Farm*, revised by Macdonald (5th ed. 1908–9); *Standard Cyclopædia of Modern Agriculture*, edited by Sir R. Patrick Wright (12 vols. 1908–10); *Encyclopædia of Agriculture*, by Green and Young (3 vols. 1907–8); *Cyclopædia of American Agriculture* (1908); *English Farming Past and Present*, by R. E. Prothero (1912); M'Connell's *Agricultural Note Book*; Wrightson's *Principles of Agricultural Practice*; and *A History of Agriculture and Prices in England*, by J. A. Thorold Rogers (8 vols. 1866–1912). On live-stock: R. Wallace's *Farm Live Stock of Great Britain* (4th ed. 1907); *Youatt's Complete Grazier*, edited by Fream (1908); J. Wilson's *Evolution of British Cattle*, Sinclair's history of *Shorthorn Cattle* and of *Hereford Cattle*, Wrightson's *Sheep* (6th ed.), and Sanders Spencer's *Pigs* (4th ed.). On scientific branches, R. Warington's *Chemistry of the Farm* (20th ed.); A. Percival's *Agricultural Botany* (3d ed.); A. D. Hall's *Feeding of Crops and Stock*, *The Soil* and *Fertilisers and Manures*; Kellner's *Scientific Feeding of Cattle* (trans. Goodwin); and Theobald's *Agricultural Zoology*. And amongst periodicals these may be consulted: *Journal of the Royal Agricultural Society of England* (annual); *Journal of the Highland and Agricultural Society of Scotland* (annual); *Journal of the Board of Agriculture* (monthly); *Journal of the Department of Agriculture for Ireland* (monthly); *Journal of Agricultural Science* (annual).

Agrigentum (Gr. *Akragas*), a Greek town on the south coast of Sicily, founded by a colony from Gela (itself a Doric colony 50 miles to the eastward), is said in the 5th century B.C. to have had 200,000 inhabitants, and its territory extended right across Sicily. It was demolished by the Carthaginians in 405 B.C., and in the Punic wars it was compelled to submit to the Romans. In 1086 A.D. it was taken from the Saracens by Roger Guiscard. The modern Girgenti (q.v.) still shows numerous and splendid ruins, of which the best preserved is the Temple of Concord.

Agrimony (*Agrimonia*), a genus of Rosaceæ (q.v.), sub-order Potentilleæ. The Common Agrimony (*A. eupatoria*) is a native of Britain and other parts of Europe, growing in borders of fields, on waysides, &c.

Agrippa, Cornelius (1486–1535), a cabbalistic philosopher, born at Cologne of noble family,

early entered the service of the Emperor Maximilian, was Colet's guest at London in 1510, lectured at Pavia, and was made doctor both of law and medicine, provoked the enmity of the monks and the Inquisition at Cologne, and practised medicine at Fribourg in Switzerland and Lyons. Appointed historiographer to Charles V. at Antwerp, he published on the vanity of the sciences and on the occult philosophy, and was accounted a magician; strange tales being told of his black poodle, of his magic mirror, and of his over-curious pupil, who was rent in pieces by demons. See his Life by H. Morley (1856).

Agrippa, M. VIPSANIUS (63–12 B.C.), a Roman general who commanded Octavian's fleet at Actium (31 B.C.)., and did good service in Gaul, Spain, Syria, and Pannonia. See also HEROD.

Agrippi'na, daughter of Agrippa and Julia (daughter of Augustus), was a faithful wife to Germanicus, but, banished by Tiberius to the island of Pandataria, died by voluntary starvation in 33 A.D.—Her daughter, AGRIPPINA, one of the most detestable of women, was born at Cologne, and married Ahenobarbus, by whom she had a son, afterwards the Emperor Nero. Her third husband was the Emperor Claudius, whose enemies she systematically poisoned. Ultimately she was put to death by Nero in 59 A.D.

Agtelek, a village on the Hungarian-Czechoslovak frontier, near a remarkable labyrinth of stalactitic caverns, some nearly 100 feet in height.

Aguado, ALEXANDER MARIA (1784–1842), born at Seville of Jewish family, took service with the French, was aide-de-camp to Soult, and settling at Paris, became one of the wealthiest of bankers.

Aguas Calientes, capital of a Mexican state, 270 miles NW. of the city of Mexico; pop. 45,000.

Ague. See MALARIA.

Aguesseau, HENRI FRANÇOIS D' (1668–1751), a very learned and public-spirited lawyer, born at Limoges, was thrice chancellor of France, defended the Gallican liberties, opposed Law's financial schemes, and wrote many volumes on law, economics, philosophy, and theology.

Aguilar, a town of Spain, 26 miles SSE. of Cordova, trading in corn and wine; pop. 13,000.

Aguilar, GRACE (1816–47), born of Jewish parentage at Hackney, lived long in Devonshire, and wrote *The Spirit of Judaism* and a number of graceful religious fictions.

Aguilas, a port in the Spanish province of Murcia, exports ores, esparto, and figs; pop. 6000.

Agulhas, CAPE, the most southern point of Africa (q.v.), lies about 100 miles ESE. of the Cape of Good Hope. The Agulhas Bank extends along the whole southern coast of Africa.

Ahab, king of Israel, allied himself in 854 B.C. with Assyria (q.v.) against Syria. He married Jezebel, daughter of Ethbaal, king of Sidon, and by her was the father of Athaliah (q.v.). He sanctioned the worship of Baal. Mesha, king of Moab, was tributary to him.

Ahasue'rus is the name or title by which several kings of Media and Persia are mentioned in Scripture (see ESTHER); as also the traditional name of the Wandering Jew (q.v.).

Ahaz, king of Judah, hard pressed by Edomites and Philistines, by Israel and Damascus, called to his aid Tiglath Pileser of Assyria (q.v.).

Ahlquist, AUGUST ENGELBERT (1826–89), professor of Finnish at Helsingfors, wrote grammatical and lexicographical works.

Ahmedabad' (better *Ahmadabad*), chief town of a district in Guzerat, second amongst the cities of the province of Bombay, is 50 miles NE. of the head of the Gulf of Cambay. It was built in the year 1412 by Ahmed Shah, and finally came under the power of the British in 1818. It was formerly one of the largest and most magnificent cities in the East, and in the 18th century had a pop. of 900,000. Its architectural relics are gorgeous, even in the midst of decay, and illustrate the combination of Saracenic with Hindu forms mainly of the Jain type. The Jama Masjid, or Great Mosque, rises from the centre of the city, and is adorned by two superbly decorated minarets. There is likewise an ivory mosque, so called because, although built of white marble, it is lined with ivory and inlaid with a profusion of gems. There are some twelve other mosques and six famous tombs. The modern Jain temple is of singular beauty. The prosperity of the place was almost wholly destroyed by the rapacity of the Mahrattas, but it has largely recovered, and is still famous for its manufacture of rich fabrics of silk and cotton, brocades, and articles of gold, silver, steel, and enamel. The pottery is very superior; and paper of various sorts is largely manufactured, chiefly from jute. Pop. (1901) 185,889; (1921) 274,202.—The *district*, mainly a great alluvial plain, has an area of 3800 sq. m., and a pop. of 1,000,000, of whom about a tenth are Mohammedans.

Ahmednag'ar (*Ahmadnagar*), a town of the province of Bombay, 122 miles E. of Bombay, is the third city of the Deccan. In 1797 it fell into the hands of the Mahrattas, and in 1817 of the British. It became a municipality in 1855. Strong carpets, cotton and silk cloths, and copper and brass pots are manufactured. Population 42,940, mostly Hindus. There are several smaller places of the same name in India.

Ahmedpur', a meanly built town of India, in the native state of Bahawalpur, 25 miles SW. from Bahawalpur; pop. 18,414.

Ahmed Shah, the first monarch of Afghanistan, born about 1724, was the son of Seman Khan, chief of the Abdali tribe. He served in the bodyguard of Nadir Shah (q.v.), and on his assassination retired to Afghanistan, where he induced the native tribes to revolt and to choose him sovereign. His wealth and military talents made him popular, and he gradually so far extended his conquests that, on his death in 1773, he left to his son, Timur, an empire which reached from Khorasan to Sirhind, and from the Oxus to the Indian Sea.

Ahn, JOHANN FRANZ (1796–1865), was born at Aix-la-Chapelle, and was a teacher in his native city and at Neuss. His French Grammar for Germans (1834) went through more than 200 editions, and was succeeded by similar works on English, Italian, and Dutch. Ahn's method—an extension of Seidenstücker's (died 1817)—is that of making the example precede the rule, so that the pupil learns a foreign language much as, when a child, he learned his own.

Ah'riman (Zend, *anro mainyus*, 'dark spirit'), the evil principle, opposed to Ormuzd, in the dualism of later Zoroastrianism. See ZOROASTER.

Ahwas, a town of Persia, in Arabistan province, on the river Karun (q.v.), is the centre of a grain district; pop. 4000. Near it are ruins of the capital of Artabanus, last of the Parthian kings.

Aid, FIRST. See BANDAGE, AMBULANCE.

Aidan, ST, the founder of the Northumbrian Church, was sent from Iona in 635, in answer to King Oswald's summons, to become the Bishop of Northumbria. He established himself in the island of Lindisfarne, and, thence making missionary

journeys to the mainland, achieved a great work, in spite of the ravages of Penda, the heathen ruler of Mercia. He died at Bamborough in 651.

Aïdé, HAMILTON (1830–1906), English poet and novelist, was born at Paris, the son of an Armenian and of a daughter of Admiral Sir George Collier. He served seven years in the British army, and then settling down in the New Forest, devoted himself to literature. Among his poems are *Eleonore* (1856) and *Songs without Music* (1882); among his novels, *Rita* (1859), *The Marstons* (1868), and *Passages in the Life of a Lady* (1887).

Aide-de-camp, an officer attached to the personal staff of a general officer. He carries all orders on the field of battle, and, when thus acting as the mouthpiece of the general, is to be implicitly obeyed; an aide-de-camp's mistake led to the famous but undesigned light cavalry charge in the Crimean war. In garrison and quarters the aide-de-camp superintends the general's household, and acts as his secretary. Before an officer can be appointed an aide-de-camp, he must have served a certain number of years with his regiment. Intelligence, linguistic qualifications, and good horsemanship are generally taken into account; and in practice officers above the rank of captain are seldom selected as aides. A major-general has one, a lieutenant-general two, and a general three aides-de-camp; in the field, four aides are allotted to the officer commanding in chief, and two to a brigadier; each receives an addition to the pay of his rank. As nominal head of the army, the sovereign may have an indefinite number of aides-de-camp, and the office is much sought after, both as an honour and as conferring the army rank of full colonel. In 1919 the king had (besides 'personal' and princely aides) about sixty aides-de-camp, mainly chosen for distinguished war services, and some nine naval and marine aides-de-camp.—In the United States army a lieutenant-general is allowed two aides and a military secretary, with the rank and pay of lieutenant-colonel; three and two aides respectively are allotted to major-generals and brigadiers, selected in the former case from captains and lieutenants.

Aïdin (*Guzel-Hissar*), a town of western Asia Minor, on the Meander, was built out of the ruins of the ancient Tralles. It lies 60 miles SE. of Smyrna by railway; it gave name to a vilayet, but the seat of government was Smyrna. Pop. 37,000—many Greeks, Armenians, and Jews. Its trade in morocco leather, cotton, and fruit is important.

Aids. These were originally payments to which every tenant in chivalry was liable. (1) To ransom the person of the lord when taken prisoner; (2) To make his eldest son a knight; and (3) To provide a suitable portion to his eldest daughter on her marriage. Tenants in socage were liable only to the latter two, and the mesne lords were prohibited by Magna Charta from exacting more than these three. The last feudal aid exacted was in 1346 for knighting the Black Prince. These incidents of tenure were abolished in 1672. Scutage (q.v.) and Tallage (q.v.), and the Benevolence (q.v.), were arbitrary taxes of this kind which led to disputes between English kings and their subjects down to King Edward III.'s reign, although the right to levy such taxes without the consent of the realm was formally renounced in the confirmation of charters by Edward I. The name of aid was, however, also applied, down to the time of William III., to parliamentary taxes for extraordinary purposes, including the land-tax. See FEUDALISM, TAXATION.

Aigrette is the French name of the bird known in England as Egret (q.v.), the lesser white heron. Hence the term came to be used for its feathery crest, for feathers in a lady's head-dress, and more loosely for any head-dress like a plume, a bouquet of flowers, or an ornament of precious stones. Botanically it is equal to pappus, down of a seed, like thistle down.

Aigues-Mortes (*Aquæ Mortuæ*), a small town in France (pop. about 4000), in the department of Gard, with fine complete medieval ramparts. It is situated in an extensive salt-marsh, and is about 3 miles from the Mediterranean, with which it is connected by a canal. In the middle ages, when the sea came much nearer the town, it was a very important Mediterranean harbour. St Louis sailed thence in 1248 and 1270 for the Crusades.

Aiguille (Fr., 'needle'), an instrument used by military engineers to pierce a rock for the reception of gunpowder, when any blasting or blowing-up is to be effected. The word is also used of the needle-like peaks or summits of mountains, especially in the Alps.

Aikin, JOHN, son of a Unitarian tutor, was born at Kibworth, Leicestershire, 15th January 1747, and after studying at Edinburgh and London, took his M.D. degree at Leyden University (1780). He practised in Chester, Warrington, Yarmouth, and London; but in 1798 retired to Stoke-Newington, where he died 7th December 1822. A friend of Priestley, Darwin, John Howard, and Southey, he was a voluminous author; his works including Lives of Howard, Selden, and Usher; the *General Biography* (10 vols. 1799–1815); and the well-known *Evenings at Home* (6 vols. 1792–95), written in conjunction with his sister, Mrs Barbauld (q.v.).—His daughter, LUCY AIKIN, was born at Warrington, 6th November 1781, and died at Hampstead, 29th January 1864. She was author of *Epistles on Women* (1810); *Lorimer, a Tale* (1814); *Memoir of John Aikin, M.D.* (1823); *Memoirs of the Courts of Elizabeth, James I., and Charles I.* (6 vols 1818–33); and *Life of Addison* (1843). See her *Memoirs, Miscellanies, and Letters* (1864).

Aikman, WILLIAM, Scottish portrait-painter, was born at Cairnie, Aberdeenshire, in 1682, and died in London in June 1731. Intended by his father for the law, he followed the bent of his own inclination, and studied art instead in Edinburgh and Rome. Aikman settled in Edinburgh, and practised portrait-painting with success till 1723, when he was persuaded by the Duke of Argyll to remove to London. He executed many important commissions, including portraits of Gay, Thomson, John Duke of Argyll, Lady Grizel Baillie, and Allan Ramsay. His style was modelled on that of Kneller.

Ailanto (*Ailantus glandulosa*, the 'tree of heaven'), a lofty and beautiful tree, of the natural order Simarubaceæ, a sub-order of Rutaceæ, a native of South-eastern Asia, was brought from China in 1751, and is now frequently planted to shade public walks in France and Italy. It has also been introduced into Germany, Britain, and the United States, but is apt to be injured by frost when young. The leaves are large and pinnate, with an odd leaflet resembling those of the ash. The tree grows very well on chalky soils, and is easily propagated. The wood is fine grained, satiny, and suited for cabinet-making, and the leaves afford nutriment to a species of silkworm (*Bombyx Cynthia*). It is sometimes known as Vernis du Japon, apparently by confusion with certain species of Rhus.

Ailly, PIERRE D' (or Petrus de Alliaco), theologian and Nominalist philosopher, was born in 1350. Chancellor of the university of Paris, and Bishop of Compiègne, he was made cardinal in 1411, and a papal legate in Germany. He took a chief part in

the Council of Constance, where he headed the reform party, but agreed to the sentence on Huss and Jerome of Prague. He died at Avignon in 1419.

Ailsa Craig, a rocky islet of Ayrshire, 10 miles W. by N. of Girvan. Rising abruptly out of the sea to a height of 1114 feet, it forms a most striking object. It is about 2 miles in circumference, and is accessible only at one point, where the accumulation of débris has formed a rough beach. The rock may be described generally as a mass of trap, assuming in some places a distinct columnar form, with dimensions far exceeding those of the basaltic pillars of Staffa. On the NW., perpendicular cliffs rise to a height of from 200 to 300 feet; on the other sides, the Craig descends to the sea with a steep slope, covered with grass and wild-flowers, with numerous scattered fragments of rock. Till the erection of a lighthouse (1883–86), the only inhabitants were goats, rabbits, and wild-fowl; solan geese, in particular, breeding in the cliffs in countless numbers. About 200 feet from the summit are some springs, and on the ledge of a crag on the eastern front, are the remains of an ancient stronghold. In 1831, the Earl of Cassillis, the proprietor of Ailsa Craig, was raised to the dignity of Marquis of Ailsa.

Aimard, GUSTAVE, the French Fenimore Cooper, was born in Paris, 13th September 1818, and shipping as a cabin-boy to America, spent those ten years of adventure in Arkansas and Mexico which furnished the themes of most of his novels. He travelled also in Spain, Turkey, and the Caucasus; in Paris served as an officer of the Garde Mobile (1848); organised the Francs-tireurs de la Presse against the Germans (1870–71); and after some years' confinement in an asylum, died 20th June 1883. Of his very numerous novels many have been translated into English. Gustave Aimard was a pen-name, his real name being Ollivier Gloux.

Ain, a French river rising in the mountains of Jura, and flowing 118 miles south-westward, through the departments of Jura and Ain, till it falls into the Rhone, 18 miles above Lyons.

Ain, an eastern department of France, separated from Savoy by the Rhone. The eastern part is mountainous, with summits 5000 to 6500 feet high. The area is 2240 square miles, and the population about 316,000. Bourg is the capital.

Ainger, ALFRED, son of a London architect, was born in 1837, graduated from Trinity Hall, Cambridge, and after holding a cure near Lichfield, in 1866 became a reader at the Temple Church, in 1887 a canon of Bristol, and in 1894 Master of the Temple. Author of the articles on Lamb and Hood in this work; of selections, with a memoir, from Hood; and of a book on Crabbe ('Men of Letters' series, 1903), he is best known in literature as biographer (1882, 1888) and editor (6 vols. 1883–88) of Lamb. He died 8th February 1904.

Ainmiller, or AINMÜLLER, MAX EMANUEL (1807–70), was born in Munich, was trained in the royal porcelain manufactory there, but, discovering new methods in glass-painting, became director of a great establishment for that art.

Ainos, a race who were probably the first inhabitants of Japan, but who now are reduced to about 15,000, confined chiefly to the islands of Yezo and Sakhalin. They are short in stature, but strongly built, and the bodies of many are covered with short, bristly hair. They speak a language distinct from Japanese, and appear to be rapidly dying out. Their features are rather European than Mongolian. They exist principally by hunting and fishing, and are polygamous. See JAPAN; and books by Chamberlain (1887), Batchelor, Savage Landor (1893), and Torii (1919).

Ainslie, HEW (1792-1878), poet, was a native of Ayrshire, who in 1809 became clerk in the Register House at Edinburgh, and in 1822 emigrated to America, where, after a spell in Robert Owen's community at New Harmony (q.v.), he managed breweries. He wrote three or four very fair lyrics and more than a hundred very indifferent ones, and a *Pilgrimage to the Land of Burns* (1822; new ed. 1892).

Ainsty, a territorial division or jurisdiction in some parts of England, as in Cambridge, Dorset, Devon, but especially York (q.v.); see *Notes and Queries*, July 1904.

Ainsworth, ROBERT (1660–1743), lexicographer, was born at Woodvale, near Manchester; and, educated at Bolton, taught a school there, until, about 1698, he removed to London. In 1714–36 he produced his (now obsolete) Latin Dictionary—one of several educational works.

Ainsworth, WILLIAM FRANCIS, an English physician, geologist, and traveller, was born at Exeter in 1807. He studied medicine at Edinburgh, and, after receiving (1827) his medical diploma, he travelled in France, and prosecuted geological investigations in the Auvergne and Pyrenean mountains. Returning to Edinburgh in 1828, he conducted the publication of the *Journal of Natural and Geographical Science*, and delivered lectures on geology. In 1832–33 he did good service against the cholera; in 1835 he was attached as physician and geologist to the Euphrates expedition under Colonel Chesney, and returned home in 1837 through Kurdistan, the Taurus, and Asia Minor. In 1838–41 he visited the East with Rassam and Russell, their chief objects being to explore the course of the Halys, and to visit the Nestorian Christians in Kurdistan. Amongst his works are *Researches in Assyria, &c.* (1838); *Travels in Asia Minor, &c.* (1842); *The Claims of the Christian Aborigines of the Turkish Empire* (1843); and *Travels in the Track of the 10,000 Greeks* (1844). He died 27th November 1896.

Ainsworth, WILLIAM HARRISON, was born in Manchester, February 4, 1805, and educated at the grammar-school. A solicitor's son, in his seventeenth year he was articled to a solicitor; and on his father's death in 1824, came up to London to complete his legal studies. Two years later, however, he married a publisher's daughter, and himself turned publisher for eighteen months. He had contributed some articles to magazines prior to 1822, so that his first-born was not *Sir John Chiverton* (1826), an anonymous novel, bepraised by Scott, but partly, it seems now, the work of a Mr Aston. Anyhow, his earliest hit was *Rookwood* (1834), with its vivid description of Dick Turpin's ride to York. By 1881, a period of close upon half a century, he had published no fewer than thirty-nine novels. Several of these appeared originally in *Bentley's Miscellany*, *Ainsworth's Magazine* (1842–54), and the *New Monthly*, of which he was successively editor; and seven of them were illustrated by Cruikshank—viz. *Rookwood*, *Jack Sheppard* (1839), *Tower of London* (1840), *Guy Fawkes* (1841), *Miser's Daughter* (1842), *Windsor Castle* (1843), and *St James's* (1844). To these may be added his *Crichton* (1837), *Old St Paul's* (1841), and *Lancashire Witches* (1848), as possessing some intrinsic claim to literary merit. He died at Reigate, January 3, 1882. See Life by S. M. Ellis (1910).

Ain-Tab, a town of Turkey, on the Sadjur, an affluent of the Euphrates, 64 miles NNE. of Aleppo. The chief trade is in inferior tissues. Ain-Tab is supposed by some to be the ancient *Antiochia ad Taurum*. Pop. 70,000, composed of Turks, Greeks, and Armenians.

Aïr, or ASBEN, an oasis-kingdom in North (French) Sudan. Agades (q.v.) is the capital. The

country is principally inhabited by three tribes, all Tuaregs, with some admixture of negro blood. The valleys are naturally rich in tropical vegetation, but they are poorly cultivated. Although the valleys of Air are in the region of the tropics, the climate is comparatively temperate.

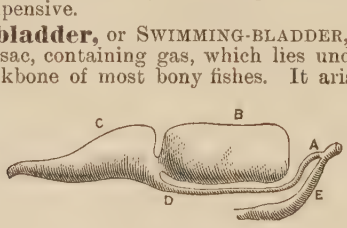
Air is the mixture of gases constituting our atmosphere. Formerly all aëriform fluids were called 'airs' (oxygen being called *dephlogisticated air*); but in this sense the word 'gas' is now used. For the chemical composition of air, its chief properties, and the phenomena they give rise to, see ATMOSPHERE; also AIR-PUMP, BAROMETER, BALLOONS, &c., GASES, STORMS, WIND, &c.; and for the law as to air, the last paragraph of the article LIGHT.

Air, in Music, see ARIA.

Air-bath. See COMPRESSED-AIR BATH.

Air-beds, or AIR-MATTRESSES, differ only in shape and size from air-cushions, half-beds, pillows, and the familiar travelling-cushions. They were first made at a moderate price after the introduction of Mackintosh cloth, an air-tight fabric consisting of two pieces of cloth united by an interposed layer of india-rubber spread on in solution. They are still made in essentially the same way, a thin sheet of vulcanised rubber being placed between the two layers of cloth, and the whole made into one fabric, so to speak, by pressure. When they are inflated, either by the mouth or by a pair of bellows, a screw stop-cock prevents the escape of air. An air-bed consists of a sack in the form of a mattress, usually divided into a number of compartments, each air-tight; a projection at one end forms a bolster. Each compartment has a valve, through which the air is blown in. Air-beds and pillows are valuable in cases of sickness, but are not so lasting or so comfortable as Water-beds (q.v.) and water-pillows, which are formed of thicker material, consisting entirely of vulcanised india-rubber. The latter are, however, double the price of the former. When the air-bed or mattress is not made with several air-tight compartments, the walls of the single compartment are tied to each other at various points, so that the whole may preserve its shape when inflated. Air-beds are not merely valuable in cases of sickness, but are useful for camping out, and are available for military purposes. Their worst fault is their liability to be spoilt by a rent or puncture; and if not taken good care of, they crack and become troublesome or useless. Air-beds were known as early as the beginning of the 18th century, but being made of leather, were expensive.

Air-bladder, or SWIMMING-BLADDER, a thin-walled sac, containing gas, which lies underneath the backbone of most bony fishes. It arises as a



Air-bladder of Carp:
Consisting of two parts, B and C, joined by a narrow neck; A D, a canal communicating with œsophagus, E.

pouch from the gut, usually from the region of the gullet, and its stalk often remains open, as the so-called pneumatic duct. In the primitive Polypterus of the Nile and West African rivers, the air-bladder lies ventrally. In the mud-fishes or Dipnoi it functions as a lung, and points the way to the lungs of land vertebrates. As to its function in ordinary bony fishes there is still some uncertainty. It has glandular tissue on certain parts of its lining, and can secrete gas, thus discharging an aerostatic function, and enabling the fish to adjust itself to varying pressure at different depths. The store of oxygen may possibly help in some cases in respiration. As the anterior end of the air-bladder is often connected with the ear, the organ may act as a resonator, or possibly in making the fish more sensitive to changes of pressure and the like. In a few cases the muscular contraction of the bladder produces sounds by setting internal membranes in vibration. This interesting organ has also some practical importance to man since it furnishes the finest kind of isinglass. See also the article FISHES.—The AIR-SACS connected with the lungs of birds are treated in an article at page 113 below.

Air-cells, or preferably AIR-SPACES, in plants, are cavities containing air in the stems or leaves, which aid greatly in effecting the interchange of gases necessary for the life of the plant. They consist for the most part either of the intercellular spaces, or of cavities formed by rupture, as in grass and umbelliferous stems. In terrestrial plants they communicate with the exterior by means of the *Stomata* (q.v.). An interchange is thus established between the living cells of the plant and the outer air, and this is helped by movements due to wind, by changes of temperature, and the like. They are especially large and numerous in many Aquatic Plants (q.v.) which are partly or entirely floating—mainly owing their buoyancy to this cause.

Aird, THOMAS, minor poet, was born at Bowden, Roxburghshire, in 1802, and in 1816 passed from the parish school to the university of Edinburgh. There he made Carlyle's acquaintance; whilst, as tutor in the family of a Selkirkshire farmer, he often met Hogg, the Ettrick Shepherd. He was destined for the church, but preferred to devote himself to letters, and in 1826 published *Martzoufle, a Tragedy, with other Poems;* in 1827, *Religious Characteristics,* a series of prose essays which Professor Wilson eulogised in *Blackwood's Magazine.* From 1835 till 1863 Aird edited the *Dumfries Herald,* a new Conservative journal. *The Devil's Dream,* his best-known poem, has a Landoresque, if not Dantesque grandeur; but Aird's poetry has never become popular. Whether the themes are colossal, as in *The Devil's Dream,* or pathetic, as in *My Mother's Grave,* there is the same clear, vigorous, picturesque word-painting. In 1845 appeared his *Old Bachelor in the Scottish Village,* a volume of tales and sketches; in 1848, a collected edition of his poems; and in 1852 he edited the select poems of David Moir ('Delta'). Aird died at Dumfries, 25th April 1876. See the Life by J. Wallace, prefixed to the fifth edition of his poems (1878).

Airdrie, a flourishing town in NE. Lanarkshire, 2 miles E. by N. of Coatbridge, and 11 E. of Glasgow. Standing on the high-road between Edinburgh and Glasgow, near the Monkland Canal and the London and North Eastern Railway, it owes its prosperity and rapid growth to the abundance of coal and ironstone in the vicinity. Mining, iron manufacture, and engineering are the leading industries. The weaving of cotton goods for Glasgow manufacturers is carried on to a considerable extent, as also is paper-making. In 1832–1918 it united with Falkirk, &c., in sending a member to parliament, and it became a municipal burgh in 1849. Pop. (1831) 6594; (1861) 12,918; (1891) 15,133; (1901) 22,288; (1921) 25,092.

Aire (ancient *Vicus Julii*), a French town in the department of Landes, on the Adour, 112 miles S. of Bordeaux. It is a bishop's seat, and has an ancient cathedral. Aire, famous in Roman times, was the capital of the Visigoths under Alaric, but is now much decayed. Pop. 4000.

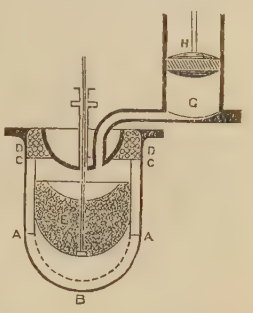
Air-engine, a form of heat-engine in which air is the working substance. Captain Ericsson called his latest air-engine a *caloric-engine* (see CALORIC).

It is a well-known condition, applicable to all heat-engines, that (presupposing the working parts of the machine to be the best possible) the heat converted into work bears the same proportion to the total heat given to the working substance as the range of temperature bears to the *absolute* temperature of the source of heat. Thus, supposing an engine to receive steam (and the law is the same for steam, air, or *any other substance whatever*) at the temperature of 275° F., and discharge it at that of 120° F., the fraction of heat which it can convert into work will be $\frac{275 - 120}{275 + 461}$ or about 21 per cent. of the total heat supplied. This proportion would be, of course, greatly reduced in practice, owing to imperfections in the machinery; but these being equally likely to occur in all prime movers, we need not consider them here. The *lowest* limit of temperature available being practically constant, fixed either by the temperature of the atmosphere, or that obtainable in a condenser, it follows that greater economy can only be looked for in the direction of increase of initial temperature. In ordinary steam-engines, in which the pressure and temperature increase simultaneously, the latter is limited by the former, which in its turn is kept, by considerations of safety, comparatively low. When, however, *superheated* steam (steam whose temperature is above the condensing-point) or heated air is used, the temperature is limited only by the power of the metals composing the machine to resist the internal pressure of the steam or air, the destructive action of heat, or the chemical action of the fluid at that temperature. With heated air an explosion, at a given temperature, is less likely because of the lower pressure, and would be comparatively harmless. It also enables the separate boiler to be dispensed with. With steam, the danger arises from the great increase of volume when water evaporates, unless the steam is subjected to very great pressure.

Air-engines, in their principal working parts, are very similar to ordinary steam-engines. The heated air is introduced into a cylinder, in which works a closely fitting piston, which is thus compelled to move up and down, and transfers its motion to a revolving shaft by means of a piston and connecting-rod in the usual manner. The motion of the piston results in all cases from the expansion of the heated air; the air is heated by means of a furnace, is introduced below the piston, raises it, and then is allowed to escape into the atmosphere. Air-engines are almost invariably single-acting; they are sometimes worked simply by heated air, and sometimes with the air which, having passed through the furnace, is mixed with all the gaseous products of combustion. The latter method has the immense advantage that it utilises the heat which would otherwise be rejected into the chimney, and so prevents considerable waste of fuel.

The more heat carried away by the discharged air—the higher its temperature, in other words—the smaller evidently is, *ceteris paribus*, the range of temperature of the machine, and the less, therefore (as already explained), will be its efficiency. The distinctive principle of Stirling's air-engine, as of the later air-engines, consists in utilising a great part of this wasted heat, and thus economising fuel. This is effected by means of a 'regenerator,' or, more properly, 'economiser,' consisting of a chamber filled with metallic sieves of wire-gauze, through which the hot air is made to pass *outwards* from the cylinder, after having performed its work on the working-piston of the engine. As much of the heat of the escaping air is taken up by the regenerator, and its temperature thus reduced, the range of temperature of the machine is correspondingly increased. The fresh air entering the cylinder for the next stroke is compelled to pass *inwards* through the regenerator, and abstracts from it the heat left in it. In this way it does not require to receive so much heat in the furnace as would otherwise be the case, and thus economises fuel.

The figure shows one of Stirling's air-engines. E is the plunger which works in the receiver CAB. This receiver is double, the inner lining being pierced with small holes to admit of communication between the annular space and the interior. The regenerator is placed in the space AC. By the motion of the plunger the air is alternately admitted to the upper and under portions of the receiver, passing through the regenerator. The upper portion is always in communication with G, the cylinder, in which the piston H works. At D is placed the 'refrigerator,' a coil of copper tube through which cold water passes. This refrigerator abstracts the heat wasted through imperfect action of the regenerator.



This method of preventing waste of heat was first discovered by the Rev. Dr Stirling, who obtained a patent for it in 1816. In working with air at the ordinary pressure of the atmosphere, however, the engine was found to require to be of large dimensions as compared with a steam-engine of the same power; and in order to obviate this objection, compressed air was used, the idea originating with Mr James Stirling, C.E. Several other difficulties were successfully surmounted by the Messrs Stirling, and eventually two improved engines were constructed, one of which was tested to fully 40 horse-power. This latter engine did all the work of the Dundee Foundry Company regularly for upwards of three years, during which period they employed no other motor. At the end of this period it was laid aside, principally owing to the repeated failure of one of the heating vessels.

Captain Ericsson, in his attempt to introduce his caloric-engine in the ship which bore his name, experienced precisely the same difficulties and disappointments, and tried nearly the same remedies. The chief trouble is failure of the material of the heater, caused by the rapid changes of temperature. Nevertheless air-engines of slight power are frequently used—for example, in laboratories—to drive a propeller maintaining circulation of water in a vessel whose temperature is wished to be kept constant.

Air-engines have recently been constructed, in which solar rays, concentrated by means of an arrangement of mirrors, are utilised as the source of heat. These have been called *solar* engines. For a very different kind of air-engine, see COMPRESSED AIR MOTORS.

Aire-sur-l'Adour. See AIRE.

Aire-sur-la-Lys, a fortified town in the French department of Pas-de-Calais, on the Lys, and at the junction of three canals, 37 miles W. of Lille by rail. It has one fine church, St Pierre, some cotton and woollen manufactures, and a considerable trade. Pop. 8200.

Air-force. See BALLOONS AND AEROPLANES.

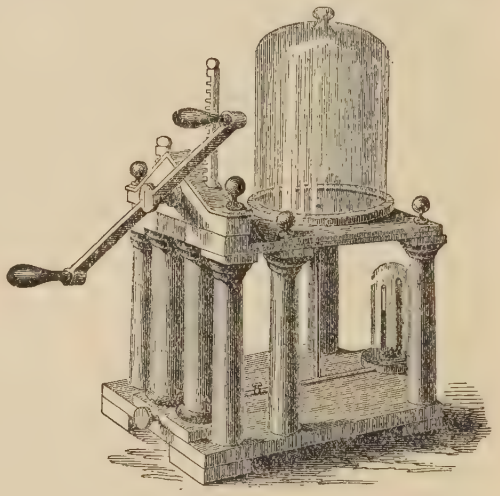
Air-gun. There are several forms of this weapon, but it is commonly made like a fowling-piece or musket, with lock, stock, and barrel. In one of the simplest kinds there is an air-chamber placed above the barrel, and the two communicate by a valve opening just behind where the bullet is placed. By means of a syringe in the stock, the air is condensed in the chamber. On pulling the trigger the valve opens, and immediately the bullet is projected with considerable force by the elasticity of the compressed air behind it. In air-guns, the reservoir of condensed air is usually very large in proportion to the tube which contains the ball, so that its elastic force is not greatly diminished by expanding through it. These guns commonly propel a bullet to a distance of from 60 to 80 yards. One form of air-gun contains several bullets in a receptacle or channel under the barrel; by the movement of a cock or lever, one of these bullets can readily be shifted into the barrel; and thus several successive discharges can be made after one loading—on a principle somewhat analogous to that of the revolving pistol. Some varieties of air-guns have the condensing syringe detached, by which means greater condensation of air may be produced; this done, the air-chamber is again attached to the barrel. A pressure of as much as 500 atmospheres has been attained with a powerful condenser, but even this is only about half the elastic force of fired gunpowder. Those air-guns which present the external appearance of stout walking-sticks, and are thence called air-canes, have a chamber within the handle for containing condensed air, which can be unscrewed, and subjected to the action of the condensing syringe. The air-gun was known in France more than two centuries ago; but the ancients were acquainted with some kind of apparatus by which air was made to act upon the shorter arm of a lever, while the larger arm impelled a bullet. Several English patents were taken out for peculiar forms of air-guns in the last quarter of the 19th century. They are sometimes made in the form of simple walking-sticks (their real nature being disguised), and carried for personal defence in an emergency. Inventions for using compressed air to fire large shots with pieces of ordnance were patented by Bessemer (1867) and others. Lieutenant Zalinski of the U.S. army invented in 1886 a large 'pneumatic gun' for throwing shells containing dynamite. The gun was of iron, 60 feet long, 8 inches in the bore, and ½ inch thick. Air at 1000 lb. pressure, supplied from eight reservoirs, each 20 feet long by 12 inches in diameter, was admitted through one of the trunnions to a chamber in the gun just behind the projectile. An automatic valve permitted a volume of the compressed air to escape into this chamber. A war-vessel was equipped with three of these guns and used by the Americans in the Cuban war of 1898. They have been used for harbour defence; and a pneumatic field-gun for throwing shells filled with explosive gelatine, with a range of 3600 yards, was used with some effect in the Cuban war.

Air-lock. When hollow cylinders (*Caissons*, q.v.) of iron are used for founding the piers of bridges under water, it is now the custom to use condensed air in them, the pressure of which does not generally exceed two atmospheres beyond the ordinary atmospheric pressure This iron shell is open at the bottom, but air-tight and water-tight at all other points; thus water is prevented from rising in it. As part of the arrangement, it is necessary to have at the top of the caisson or elsewhere a chamber, called an *air-lock*, to serve for the exit and entrance of men and materials. This comparatively small chamber has an outer and an inner door. The outer door is shut after a man enters, and just then the air around him is at its ordinary pressure. But before the inner door is opened, the air in this chamber is compressed like that in the caisson, and he can then descend to his work.

Airolo, an Italian-Swiss village, in the upper valley of the Ticino, and 150 yards from the southern mouth of the great St Gothard Tunnel. Pop. 2000.

Air-plants. See EPIPHYTES.

Air-pump, an instrument for removing the air from a vessel. The essential part is a hollow brass or glass cylinder, in which an air-tight piston is made to move up and down by a rod. From the bottom of the cylinder, a connecting tube leads to the space which is to be exhausted. This space is usually formed by placing a bell-glass, called the receiver, with edges ground smooth, and smeared with lard, on a flat, smooth plate or table. When the piston is at the bottom of the barrel, and is then drawn up, it lifts out the air from the barrel,



Air-pump.

and a portion of the air under the receiver, by its own expansion, passes through the connecting tube, and occupies the space below the piston, which would otherwise be a vacuum. The air in the receiver and barrel is thus *rarefied*. The piston is now forced down, and the effect of this is to close a valve placed at the mouth of the connecting tube, and opening inwards into the barrel. The air in the barrel is thus cut off from returning into the receiver, and, as it becomes condensed, forces up a valve in the piston, and escapes into the atmosphere. When the piston reaches the bottom, and begins to ascend again, this valve closes; and the same process is repeated. Each stroke diminishes the quantity of air in the receiver. Theoretically, there must always be a portion left, though that portion may be rendered less than any assignable quantity; and, apart from leakage, the process is limited by the pressure of the remaining air being insufficient to open the valves. The degree of rarefaction is indicated by a *gauge* on the principle of the barometer. By means of the partial vacuum formed by the air-pump a great many interesting experiments can be performed, illustrating the effects of atmospheric pressure, and other mechanical properties of gases. The air-pump was invented by Otto Guericke (q.v.), 1654; and though many improvements and varieties of structure have been since devised, the principle of all, even the modern rotary, mechanically very

different, types, or the types in which a falling column of liquid is used, is the same. In the old type two barrels are generally used, so as to double the effect of one stroke. The inflater used for bicycle and motor pneumatic tyres is also an air-pump, used with the converse purpose of forcing in air. For other uses of compressed air, see BORING, BRAKE, DIVING.

Air-sacs are outgrowths from the lungs of birds. They lie in the chest and abdominal region, are in direct connection with the branches of the bronchial tubes, and are usually nine in number. The air entering those reservoirs is warmed, and must to a slight extent lessen the specific gravity of the bird. The air-sacs increase

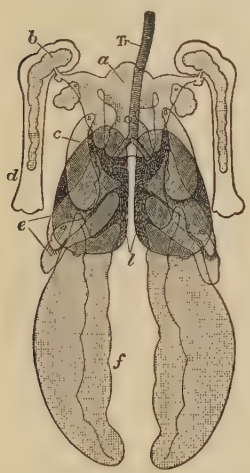


Diagram of Lungs and Air-sacs of the Pigeon:
Tr, trachea; *l*, lungs; *a*, peritracheal air-sac with its diverticula (*b* and *c*) into the humerus (*d*) and between the pectoral muscles; *e*, intermediate air-sacs; *f*, abdominal or posterior air-sacs.
(From Claus, after Heider.)

the respiratory content, secure more thorough aeration of the lungs, and assist in internal perspiration, thus helping in the regulation of the body temperature. In most birds some of the air-sacs communicate with an extensive series of air-spaces in the bones and under the skin. Hints of these air-sacs, so characteristic of birds, are to be found in some reptiles.

Air-ship. See BALLOONS AND AEROPLANES.

Airy, SIR GEORGE BIDDELL, K.C.B., Astronomer Royal, was born at Alnwick, 27th July 1801. In 1819 he went to Trinity College, Cambridge, of which he was elected scholar (1822) and fellow (1824), having the year before come out senior wrangler. In 1826 he was elevated to the Lucasian professorship of mathematics, which he rescued from the reproach of being a sinecure, by delivering a course of public lectures on experimental philosophy; in 1828, he was made professor of Astronomy, and had the management of the newly erected Cambridge Observatory intrusted to him; and in 1836 he succeeded Pond as Astronomer Royal. By his introduction of new or more perfect scientific instruments, and of more rapid methods of calculation; by his researches in magnetism, meteorology, photography, &c. he deservedly obtained the reputation of being one of the ablest and most indefatigable of modern savants. To observe total solar eclipses, he visited Turin (1842), Gothenburg (1851), and Pobes, in Spain (1860); he was president of the Royal Society (1871–73); and in 1871 he became a Companion (Civil) of the Bath; in 1872, a Knight Commander. Among his works have been *Astronomical Observations* at Cambridge and Greenwich (20 vols. 1829–57); *Catalogue of 2156 Stars* (1849); *Ipswich Lectures on Astronomy* (1851); *Algebraical and Numerical Theory of Errors of Observations* (1861); *Undulatory Theory of Optics* (1866); *Atmospheric Chromatic Dispersion* (1869); *Magnetism* (1871); and *Notes on the Earlier Hebrew Scriptures* (1876). He retired on a pension in 1881, and died in London, 2d January 1892.

Aisle (from Lat. *ala*, 'a wing') means any lateral division of any part of a church, whether attached to the nave, choir, or transept. The number of aisles varies in different churches. In England, as a rule, there is only one on each side of the nave or choir; in most foreign countries, there are frequently two, and at Antwerp and elsewhere there are three. The continental edifices, it would seem, have antiquity in their favour for this arrangement (see BASILICA, CHURCH). The word is often incorrectly applied to the passage between church pews.

Aisle—Melrose Abbey.

Aisne, a French river, flowing 150 miles northwestward and westward through the departments of Marne, Ardennes, Aisne, and Oise, till it falls into the river Oise, above Compiègne. It gives name to a battle (Sept.–Oct. 1914) in the Great War.

Aisne, a department in the north of France, comprising parts of Picardy, Brie, and the Isle of France; area, 2839 sq. m. Hilly in the south, level in the north, it belongs to the basin of the Seine, and is watered by the rivers Aisne, Marne, and Oise, and by other navigable streams and canals. The soil is fertile, the chief products being grain, hay, wine, and cider. It is the seat of considerable woollen and other manufactures. Laon is the capital. Pop. (1901) 534,204; (1921) 421,515.

Aiwalyk (*Aivali*), a seaport in NW. Asia Minor, on the Gulf of Edremid (Adramyti); pop. 35,000, most of whom are Greeks. There is a considerable trade in olives and oil.

Aix, a French town, formerly the capital of Provence, in the department of Bouches-du-Rhône, 20 miles N. of Marseilles. It is believed to have been founded by the Roman consul, C. Sextius (120 B.C.), on account of the mineral springs in the neighbourhood, and thence to have got the name *Aquæ Sextiæ*. Aix is the seat of an archbishop, and possesses a college with three faculties, and a public library with 150,000 volumes and 1100 MSS. The baptistery of the cathedral is believed to have been originally a temple of Apollo. There is also an old clock-tower with a quaint mechanical clock. The industry of this again flourishing town consists chiefly in the cultivation of the olive, in cotton-spinning, leather-dressing, and trade in oil, wine, almonds, &c. The warm springs are slightly sulphurous, with a temperature from 90° to 100° F., clear and transparent as the purest well-water, almost free from smell, yet with a slightly bitter taste. The field on which Marius defeated the Teutones lies in the plain between Aix and Arles. In the middle ages, under the Counts of Provence (q.v.), Aix was long the literary capital of southern Europe. Pop. 30,000.

Aix-la-Chapelle (Ger. *Aachen*), the capital of a district in Rheinland, is situated in a fertile hollow, surrounded by heights, and watered by the Wurm, 39 miles W. by S. of Cologne. Pop. (1867)

67,923; (1910) 156,044; (1919) 145,748, not 7 per cent. Protestants. Aix-la-Chapelle is the centre of a valuable coal district, and of numerous thriving manufactories, especially for spinning and weaving woollen fabrics, and for needle and pin making. There are also immense manufactures of machinery, bells, glass buttons, chemicals, and cigars. As a principal station on the Belgian-Rhenish railways, Aix is an important centre of trade. The city is rich in historical associations. It emerges from historical obscurity about the time of Pepin; and Charlemagne founded its world-wide celebrity. Whether it was his birthplace is doubtful, but in 814 it became his grave. In 796 he had rebuilt the imperial palace, as well as the chapel in which Pepin had celebrated Christmas in 765. The present town-house was built in 1353 on the ruins of the palace; the chapel, after being destroyed by the Normans, was rebuilt by Otho III. in 983, and forms the nucleus of the cathedral. This ancient cathedral is in the form of an octagon, which, with various additions round it, forms on the outside a sixteen-sided figure. In the middle of the octagon, a stone, with the inscription 'Carolo Magno,' marks the site of the grave of Charlemagne. In 1215 Frederick II. caused the remains of the emperor to be inclosed in a costly shrine. In the newer part of the building are kept the so-called 'great relics,' which, once in seven years, are shown to the people in the month of July, and which attracted thousands of strangers in 1909. Much has of late years been done to restore this venerable pile. The columns brought by Charlemagne from the palace of the Exarch at Ravenna, to decorate the interior of the octagon, had been carried off by the French; but most of them were restored at the peace of Paris, and replaced in 1846. The town-house, adorning the market-place, is flanked by two towers older than itself, which suffered much by fire in 1883. Its coronation-hall, 162 feet long by 60 wide, in which thirty-five German emperors and eleven empresses have celebrated their coronation banquet, has been restored to its original form, and the walls have been decorated with frescoes of scenes from the life of Charlemagne. Before the town-house stands a beautiful fountain, with a bronze statue of Charlemagne. As a town, Aix-la-Chapelle has recently been much improved. It now possesses broad streets, many fine public buildings, tasteful churches, and luxurious hotels; and from being a quiet old city of historical interest, has become a busy centre of manufacturing industry.

The name of the place is derived from the springs, for which it has been always famous. Aa or Aachen is derived from *aach*, an old German word for water; the French *Aix* is the Latin *aquæ*, while the *Chapelle* in the French name is the chapel of the palace. Charlemagne granted extraordinary privileges to this city. The citizens were exempted, in all parts of the empire, from personal and military service, from imprisonment, and from all taxes. In the middle ages, this free imperial city contained more than 100,000 inhabitants. The emperors were crowned in Aix-la-Chapelle from Louis the Pious to Ferdinand I. (813–1531). Seventeen imperial diets and eleven provincial councils were held within its walls. The removal of the coronations to Frankfort, the religious contests of the 16th and 17th centuries, a great fire which in 1656 consumed 4000 houses, combined with other causes to bring into decay this once flourishing community. In 1793, and again in 1794, Aix-la-Chapelle was occupied by the French. By the treaties concluded at Campo Formio and Lunéville, it was formally ceded to France, until in 1815 it fell to Prussia.

The Mineral Springs of Aix-la-Chapelle, of which six are hot, and two cold, were known in the time of Charlemagne, and have been frequented since as early as 1170. The temperature of the hot springs varies from 111° to 136° F. They chiefly act on the liver, and on the mucous surfaces and skin, and are therefore efficacious in cases of gout, rheumatism, cutaneous diseases, &c. The cold springs are chalybeate, and not so copious.

Treaties of Peace and Congress of Aix-la-Chapelle.—The first Peace of Aix-la-Chapelle (1668) ended the war carried on between France and Spain for the possession of the Spanish Netherlands (see Louis XIV.).—The second Peace of Aix-la-Chapelle (1748) concluded the war respecting the succession of Maria Theresa to the empire (see Succession Wars). In general, the possessions of the several states remained as before the war. Austria ceded Parma and Placentia to the Spanish infanta, Philip; and the possession of Silesia was guaranteed to Prussia. The privilege of the Assiento (q.v.) was anew confirmed to England for four years, and the Pretender was expelled from France.

The Congress of Aix-la-Chapelle was held in 1818, for regulating the affairs of Europe after the war. It began on the 30th September, and ended on the 21st November. Its principal object was the withdrawal from France of the army of occupation, 150,000 strong, as well as the receiving of France again into the alliance of the great powers. The emperors of Russia and Austria, and the king of Prussia, were present in person. The plenipotentiaries were—Metternich, Castlereagh and Wellington, Hardenberg and Bernstorff, Nesselrode and Capo d'Istrias, with Richelieu on the part of France. The five great powers assembled signed a protocol announcing a policy known as that of the 'Holy Alliance' (q.v.).

Aix-les-Bains (*Aquæ Gratianæ*), a small town in the French department of Savoy, in a delightful valley near Lake Bourget, 8 miles N. of Chambéry. It was a much frequented bathing-place in the time of the Roman empire, and among its numerous remains of ancient times are the arch of Campanus, the ruins of a temple, and of a vapour-bath. The sulphurous hot springs, two in number, have a temperature of 109° and 113° F. They are drunk and used as baths. Pop. 9000.

Aizoaceæ. See Mesembriaceæ.

Ajac'cio, since 1811 the capital of Corsica, on the west side of the island, at the head of the Gulf of Ajaccio. Transferred to its present site in 1435, it has a fine cathedral, completed in 1585, and a spacious harbour, protected by a citadel; but its special interest is as the birthplace of Napoleon. There is a statue of him as First Consul (1850), and a monument of the emperor on horseback, surrounded by his four brothers (1865). The house of the Bonapartes, the 'Casa Bonaparte,' is now national property. The chief employments are the anchovy and pearl fisheries, and the trade in wine and olive-oil, which the neighbourhood produces in abundance, and of good quality. Of late years, Ajaccio has become a winter-resort for consumptive patients. Pop. 23,000.

Ajaigarh, a hill-fort of India, in the United Provinces, 130 miles WSW. of Allahabad. Perched on a steep granite crag, it was captured by the British in 1809. Within its walls are two great masses of ruined Jain temples, covered with the most elaborate sculptures.

Ajanta, a village in the extreme NW. of the Nizam's Dominions, 50 miles NW. of Ellora (q.v.), is famous for its old Buddhist cave-hermitages and halls, many of them richly adorned with frescoes that since their discovery in 1817 have been allowed

to go to ruin. They date from 200 B.C. to A.D. 700. See Havell's *Indian Sculpture and Painting* (1908), and *Ajanta Frescoes*, by Lady Herringham and others (1915).

Ajax (Gr. *Aias*), the name of two Greek heroes in the Trojan war: (1) Ajax the Less, son of Oïleus, king of the Locrians. He led forty ships to Troy, and was famous for swiftness of foot and skill in hurling the spear. At the capture of the city he excited the anger of Pallas by an insult offered in her temple to Cassandra, and on the homeward voyage he was overtaken by the vengeance of the goddess, and swallowed up by the waves.

(2) Ajax the Greater, son of Telamon, king of Salamis, and by his mother's side a grandson of Æacus. He sailed against Troy with twelve ships, and is represented by Homer as, next to Achilles, the bravest and handsomest of the Greeks. After the death of Achilles, Ajax and Ulysses contended for the arms of the hero, and the prize was adjudged to Ulysses, which threw Ajax into such a state of rage and despair that he killed himself with his sword. This is the subject of one of the noblest of the extant tragedies of Sophocles.

Ajmere (*Ajmir*), an ancient city of Rajputana, capital of a British district, 228 miles W. by S. of Agra by rail. It stands in a picturesque and rocky valley at the foot of Taragarh hill, and is surrounded by a stone wall with five gateways. It is rich in buildings of antiquarian interest, and has many spacious streets and fine residences, besides several mosques and temples of very massive architecture. The Dargah Khwaja Saheb, or tomb of the Mussulman saint, Muin-ud-din Chishti, who died 1239, is an object of pilgrimage. The Mayo College, a 'chiefs' college,' has been called an aristocratic Indian Eton. The principal export is cotton. Pop. 114,000, less than half Mohammedans.

Ajodhya, an ancient city of Oudh, on the right bank of the Gogra, adjacent to Fyzabad (q.v.). It was the capital of the kingdom of Kasala, and fell with the Solar line of kings. The Ramayana describes its magnificence. Its site, which is said to have extended to 96 sq. m., is marked by heaps of ruins, overgrown with jungle; but there is a small modern town, and the great fair of Ramnami yearly attracts half a million of pilgrims.

Akabah, a haven at the head of the Gulf of Akabah, the north-eastern horn of the Red Sea (q.v.). It is the ancient *Alana*, the Biblical *Elath*, a town of the land of Edom.

Akbar (i.e. 'the great,' his proper name being Jelal-ed-din-Mohammed), Mogul emperor of India, the greatest Asiatic monarch of modern times. His father, Humayun, was deprived of the throne by usurpers, and had to retire for refuge into Persia; and it was on the way thither, in the town of Amarkot, that Akbar was born in 1542. Humayun recovered the throne of Delhi after an exile of twelve years; but died within a year. The young prince at first committed the administration to a regent-minister, Beiram; but finding his authority degenerating into tyranny, he shook it off at the age of eighteen, and took the power into his own hands. At this time only a few of the many provinces once subdued by the Mongol invaders were actually subject to the throne of Delhi; in ten or twelve years, Akbar's empire embraced the whole of India north of the Vindhya Mountains, but in Southern India he was less successful. He conquered and conciliated all the independent Mohammedan and Hindu princes of Northern India from Cashmere to Behar; and although a great conqueror, was yet a greater ruler. The wisdom, vigour, and humanity with which he organised and administered his vast dominions are unexampled in the East. He promoted commerce by constructing roads, establishing a uniform system of weights and measures, and a vigorous police. He exercised the utmost vigilance over his viceroys of provinces and other officers, to see that no extortion was practised, and that justice was impartially administered to all classes of his subjects. For the adjustment of taxation, the lands were accurately measured, and the statistics taken, not only of the population, but of the resources of each province. For a born Mohammedan, the tolerance with which he treated other religions was wonderful. He gave the Hindus freedom of worship, though he prohibited cruel ordeals and the burning of widows. He was fond of inquiries as to religious beliefs; and Portuguese missionaries from Goa were sent at his request to give him an account of the Christian faith. He even attempted to promulgate a new religion of his own, an eclectic kind of deism or natural religion; but it never took root. Literature received the greatest encouragement. Schools were established for the education both of Hindus and Mohammedans; and numbers of Hindu works were translated from Sanskrit into Persian. Abul-Fazl, the able minister of Akbar, has left a valuable history of his master's reign, entitled *Akbar-nameh*. After a memorable reign of nearly fifty years, Akbar died in 1605, and was buried in a noble mausoleum at Sikandra, near Agra. See Malleson's *Akbar* (1890).

Akee (*Cupania* or *Blighia sapida*), a fruit-tree belonging to the natural order Sapindaceæ (q.v.), a native of Guinea, introduced into Jamaica in the eighteenth century. It grows to the height of 20–25 feet or upwards, with numerous branches and alternate pinnate leaves, resembling those of the ash. The flowers are small, white, on axillary racemes; the fruit is about the size of a goose's egg, with three cells and three seeds, and its succulent aril has a grateful subacid flavour. The fruit is little inferior to a nectarine. The akee sometimes produces fruit in hot-houses in Britain.—The Aki of New Zealand is a totally different plant, *Metrosideros buxifolia*, of the natural order Myrtaceæ; at first a shrub, which climbs by the aid of lateral roots, it thus attains the summit of the loftiest trees, which ultimately decay, but not until the parasite is strong enough to stand by itself.

À Kempis, Thomas. See Kempis.

Akenside, Mark, poet and physician, was born in 1721, at Newcastle. The son of a butcher, at the age of seven he was accidentally lamed for life in his father's shop. He was destined for the Presbyterian Church, and in 1739 was sent to study theology at Edinburgh, but soon abandoned it for medicine. He graduated as a physician at Leyden in 1744, and practised at Northampton, then at Hampstead, and finally in London. His success as a practitioner was never very great, owing to his haughty and pedantic manner; but at Leyden he had formed an intimacy with Jeremiah Dyson, and this rich and generous friend allowed him £300 a year. He died in London, June 23, 1770, having nine years earlier been appointed one of the physicians to the queen. Some of his medical treatises possess considerable merit. He contributed verses to the *Gentleman's Magazine* as early as 1737; and in 1744 appeared his *Pleasures of the Imagination*, a didactic poem, which was begun in his 18th year, and to which is owing whatever celebrity attaches to his name, though his *Hymn to the Naiads* (1746) is his finest production. In 1772, Dyson published his poetic works, the best edition of which is that by Dyce, with Life (1834). In *Peregrine Pickle*, Smollett has sketched Akenside to the life, as the pedant who gives an entertainment after the manner of the ancients. Akenside has little originality. The reader is carried along

by 'abundance of gay colouring and well-sounding words, filling the eye oftener than the imagination, and the ear oftener than either.' See his Life by Bucke (1832); and for Hannah More's enthusiastic encomium of his 'magnificent blank verse,' *Cœlebs in Search of a Wife*.

Akers, Benjamin Paul, an American sculptor, born near Portland, Maine, U.S., 10th July 1825; died at Philadelphia, 21st May 1861. For a time engaged in a printing-office, he studied sculpture, and after opening a studio in Portland, executed busts of Longfellow and others. He visited Italy in 1851–2, and again in 1855. His finest works were executed at Rome, such as 'Una and the Lion,' 'St Elizabeth of Hungary,' 'Dead Pearl-diver,' and a head of Milton; the last two of which have been described in Hawthorne's *Marble Faun*, called in England *Transformation*.

Akhalzikh, or Akiska, a town of the Georgian Republic, 110 miles W. of Tiflis, on an affluent of the Kur. It is the seat of a Greek archbishopric, and maintains an active trade. Pop. 23,000, two-thirds Armenians.

Ak-Hissar, a town of Asia Minor, 52 miles NE. of Smyrna; the ancient *Thyatira*, where was one of the Seven Churches of Asia. Relics of antiquity abound; cotton goods and dyestuffs are exported. Pop. 12,000.

Akhlat, or Ardish, in Armenia, on the NW. shore of Lake Van, beside the ruins of Chelat, once the home of Armenian princes; pop. 4000.

Akhnaton, or Akhunaten, was the name adopted by the heretic Pharaoh, Amenhotep IV. (see Egypt), who in the 14th century B.C. renounced the old gods and established a purified solar cult, free of tribal or national limitations. In the enthusiastic monograph of Mr Weigall (1910; new ed. 1922), he is 'the world's first idealist,' and his religion the first universal religion.

Akhtyrka, a town of Ukraine, 58 miles NW. of Kharkoff, on a small affluent of the Dnieper; pop. 23,500.

Akiba, Ben Joseph, a Jewish rabbi of the 2d century, who studied under Rabbi Eliezer, and was himself one of the principal fathers of the Mishna (q.v.). Born in Syria, he travelled through the empire, and became the most eminent teacher of his people and time. He systematised the Jewish traditions, and his *Mishna of Rabbi Eliezer* was the foundation of the religious code, although the work itself has not been preserved. Akiba entered heartily into the revolt of Bar-Cochba (q.v.), and on his overthrow was put to death with great tortures by the Romans (135 A.D.).

Akiska. See Akhalzikh.

Akjerman, or Akkerman (Rum. *Cetatea Alba;* Polish *Bielogrod*), a town of Bessarabia, on the Black Sea, at the mouth of the Dneister, with a citadel and a harbour accessible to large steamers. Soap and candles are made, fish salted, and a good wine grown. The treaty concluded here in 1826 between Russia and Turkey secured to Russia the free navigation of the Black Sea, and new privileges for Moldavia, Wallachia, and Serbia. Pop. 40,000—Russians, Greeks, Armenians, and Jews.

Akka, a wandering tribe of dwarfs in Central Africa, made known by Schweinfurth in 1874, and visited in 1882 by Junker. They are also called *Tiki-tiki* by their neighbours the Nyam-nyam. Their territory lies some two days' journey south of the Monbuttu, west of Albert Nyanza. Their average height does not exceed 4 feet 10 inches, and their projecting jaw and protruding lips give them a painfully ape-like appearance. They are timid and difficult of approach, and shun communication with strangers. They live entirely by hunting, keeping no domestic animals but poultry.

Akkad. See Accad.

Akmolinsk, a province of Western Siberia, organised in 1868. Pop. in 1910 about 1,500,000. Akmolinsk, the capital, 300 miles SW. of Omsk, was founded in 1862, and has a pop. of 20,000.

Akron, a city of the state of Ohio, United States, the capital of Summit County. It is situated 36 miles south of Cleveland, on the Little Cuyahoga, which falls into Lake Erie, and at the junction of the Ohio and Erie Canal with the Pennsylvania and Ohio Canal, at the highest point in the course of the former canal, whence its name (Gr., 'a summit'). It is also at the intersection of two railways. Akron is the chief centre of the world's rubber manufacture. To this it owes its rapid growth in population. It has woollen factories, flour-mills, and other works, driven by ample water-power. Near the town are large supplies of fireclay. It was first settled in 1825. Pop. (1870) 10,006; (1890) 27,601; (1910) 69,067; (1920) 208,435.

Aksakof, Ivan Sergéjevich, a member of a Russian family of *littérateurs*, born October 7, 1823, wrote lyrics, but is best known as the representative of panslavism. From 1880 till his death, February 8, 1886, he exerted much influence as editor of the recognised organ of his party.

Ak-shehr (*White City*), a city of Asia Minor, 65 miles NW. of Konia, and 5 miles S. of the salt lake of Ak-shehr; pop. 14,500.

Ak-su, a town of Chinese Turkestan, 260 miles NE. from Yarkand, on an affluent of the Tarim, and at the southern base of the Thian-shan Mountains. It was formerly the capital of a separate khanate; in 1867 it became a part of the state of Eastern Turkestan, under Yakoob Beg, but was conquered again by China in 1877. It is celebrated for its manufactures of cotton cloth and saddlery, and is much resorted to by caravans, as an entrepôt of commerce between Russia, Tatary, and China. Pop. 20,000, besides a Chinese garrison as numerous.

Akyab, a town of Burma, headquarters of Arakan division and Akyab district, is situated on the eastern side of the island of Akyab, at the mouth of the Kuladan River. In 1826, before the annexation of Akyab, it was a mere fishing-village: it is now a great rice port. Savage Island, with a lighthouse, shelters the excellent harbour. Pop. 38,000.—The district (5136 sq. m.), the northernmost in Lower Burma, consists of a rich and well-watered alluvial plain with forest-clad hill-country inland. The population is about half-a-million.

Alabama, one of the United States of North America, is popularly known in the Union as the Cotton State. It extends northward from the Gulf of Mexico some 330 statute miles; the state of Tennessee being on the north, Georgia on the east, Florida and the Gulf of Mexico on the south, and Mississippi on the west; 30° 13′ to 35° N. lat., 84° 53′ to 88° 35′ W. long. The seaboard has an extent of about 50 miles, excluding the shores of Mobile Bay and the minor sinuosities. The maximum breadth of the state is 202 miles. The area, as officially estimated, is 52,250 sq. m., a little more than that of England, exclusive of Wales.

The state has four strongly marked natural divisions. The southernmost portion, known locally as the Piny Woods, having an average breadth from north to south of about 125 miles, is of tertiary and quaternary formation, with a surface-covering of sandy drift. In this region are extensive forests of the yellow pine (*Pinus australis*), extremely valuable for its timber, as well as for its yield of turpentine, rosin, tar, and turpentine-oil.

Near the rivers are swamps densely timbered with valuable cypress (*Taxodium distichum*). The pine-region has for the most part a light soil. North of this coast-region comes the Cane-brake, or Black Belt, of extremely fertile cretaceous (rotten limestone) soils. A part of this belt consists of open ('bald') prairie. Good water is only procurable in some sections of this belt by means of artesian wells. Cotton is the staple product of this tract. North of the Black Belt lies the great mineral region of the state. This district is in reality the south-west terminal portion of the great Appalachian range of mountains, here, for the most part, merely broken ridges and lines of hills, among and to westward of which are found vast bodies of good coal, side by side with beds of iron-ore and limestone of enormous extent. In the north-east, especially E. of the Tennessee River, there is a mountainous tract, a continuation of the central iron district. The iron industry has been greatly developed since 1895, and the cheapest pig-iron in the world is now made here: in 1896, 65,000 tons were exported to England; in 1897, 218,633; and from 1899 onwards, over 1,000,000 annually.

The large navigable rivers, Alabama (312 miles long by survey) and Tombigbee, unite in the south-west part of the state to form the short Mobile River, which flows into Mobile Bay, near the town of Mobile. The greater part (some 18,000 sq. m.) of the state is drained by this river-system. The Black Warrior is the largest affluent of the Tombigbee; and the Cahawba (115 miles long), Coosa (335 miles long), and Tallapoosa are important tributaries of the Alabama. These main streams, with some others, are in general either navigable or may be fitted for navigation, while their minor tributaries afford vast water-power, as yet very imperfectly utilised. In the north, the great river Tennessee traverses the state, but its importance for navigation is lessened by the 'Muscle Shoals,' an extensive series of rocks and rapids, which can only be passed at very high water. Engineering works for surmounting these obstructions have been undertaken.

The mineral resources of the state are varied and important. Besides the valuable coal and iron deposits already noticed, Alabama has extensive beds of fine marble, statuary granite, and building stones in large variety. Some gold is mined in Cleburne and Talladega counties. Medicinal springs are found in nearly all parts of the state.

Among the leading productions of Alabama are cotton, maize, oats, wheat, and sweet potatoes. Rice and sugar-cane are grown in the southern counties. Apples, peaches, grapes, figs, pears, and oranges (the latter in the south) are among the fruits successfully grown. Tobacco is cultivated in the north. In general, the soils of this state are highly fertile; but in the pine barrens, and in the mountain region, there are large tracts not naturally productive.

The climate is warm but equable, the hill country and the pine forests (except near the swampy districts) are remarkably healthful; but the fertile Black Belt is not regarded as a safe place of summer or autumnal residence for unacclimatised persons. Remittent and bilious fevers are not unfrequent in this region. The rainfall is abundant, and is well distributed throughout the year; but some of the porous limestone soils are not retentive of water, and the crops often suffer from drought. The small rivers of the central region are remarkably liable to floods or freshets.

The only seaport of Alabama is Mobile; but the approach to that town is not practicable for large ships; hence Pensacola in Florida has become the principal shipping-point for the lumber and forest products of Alabama; while Savannah in Georgia, New Orleans in Louisiana, and Charleston in South Carolina, ship a large part of the cotton crop. The foreign trade in Alabama coal promises to become large.

The manufacturing interests of Alabama are rapidly developing. Pig-iron can be produced here, it is confidently asserted, more cheaply than in any other part of America; coal, iron, and limestone occurring in close propinquity. Cotton goods are largely manufactured. Much lumber is sawed in the forest region, which also affords considerable amounts of tar and naval stores.

Alabama was settled by the French, who established a fort on the Mobile River in 1702. The city of Mobile was founded in 1712. The French settlements were regarded as a part of the Louisiana colony until 1763, when the country was ceded to Great Britain by the Treaty of Paris. What is now Southern Alabama was ceded to Spain in 1783, and became a part of West Florida, while the rest of the country was given up to the United States, which, however, after 1803, claimed the Spanish part under the Louisiana purchase; but Spain did not concede this claim until 1819. Alabama was made a state of the Union in 1819, and seceded, with most of the other slave states, in 1861. After the civil war of 1861–65, the state passed through a long season of social and business depression; but since 1880 the outlook for Alabama is one of unusual promise.

The pop. of Alabama in 1800 was only 1250; (1830) 309,257; (1860) 964,201; (1880) 1,262,505; (1890) 1,513,017; (1910) 2,138,093; (1920) 2,348,174. The chief towns were, in 1920, Mobile (61,000), the only seaport, with a large shipping trade; Birmingham (179,000), one of the leading iron manufacturing cities of the country; Montgomery (43,500), capital of the state, with a large trade in cotton; Bessemer (19,000); Anniston (18,000), in the iron-making region; Selma (16,000); and Gadsden (15,000).

Alabama was the name of an armed vessel of the Confederate States, which inflicted terrible injury upon the shipping of the Northern States of the American Union during the civil war. She was built by Messrs Laird & Sons at Birkenhead, and was a screw steam-sloop of 1040 tons register, built of wood, and for speed rather than strength. Captain Semmes, who was appointed commander, superintended her equipment, and was enjoined by the Confederate government to keep the destination of the vessel as secret as possible, and carefully to avoid any infringement of law which would give the British government a pretext for seizing her. The destination of 'No. 290,' as she was called, was so well concealed, that the vessel was nearly finished before it was suspected by the agents of the United States. It had heretofore been held lawful to build vessels (not being manifestly war-vessels) for a belligerent in neutral ports, and lawful to purchase guns and stores in neutral ports, though they might be for the equipment of vessels thus built. What had been held unlawful was the equipment with guns and warlike stores, of a vessel built for a belligerent in a neutral port *previous* to her leaving the neutral jurisdiction. Captain Semmes did not intend to equip his vessel at Birkenhead; but the United States minister called upon the British government to detain 'No. 290,' submitting some evidence that she was intended for a Confederate war-vessel. The British government consulted the crown lawyers, who at first thought the evidence of destination insufficient; but after some delay, an opinion favourable to the detention of the vessel was at length given. The English lawyers were of opinion that there had been no infringement of the law, but that a case had been presented which the British government was

bound to submit to a court of law. It was too late: 'No. 290' was gone. The builders, aware of the danger of a seizure, had hastened their work, and the vessel, though unfinished, under pretence of a trial trip made her way down the Mersey to Moelfra Bay, where the work remaining to be done was soon finished. On the morning of the 31st July 1862, warning having been given that she was to be seized that day, 'No. 290' steamed away from the British coast and made for Terceira, one of the Azores, where she shipped her armament and stores, and by the 24th of August was ready for sea; and now Captain Semmes produced his commission to the sailors, named the vessel the *Alabama*, and hoisted the Confederate flag. The vessel made her first capture on the 5th of September. Within eleven days of that date, she captured and burned property the value of which exceeded her own cost.

Off the American coast, the *Alabama* gave battle to the United States gunboat *Hatteras*, an old vessel, and sunk her after a few broadsides. Her subsequent history consists of a monotonous succession of captures made in different seas, her prizes being merchant-vessels incapable of resistance, which were burned, as there was no port available for the disposal of her prizes, or, when there was convincing evidence of the neutral ownership of the cargo, which did not often happen, liberated upon bond. She captured in all 65 vessels; and the value of the property she destroyed was estimated at $4,000,000. It was, however, by the heavy insurance for war-risks to which she subjected the shipowners of the United States, and still more by the difficulty she caused them in getting freights, that the *Alabama's* career inflicted the greatest injury. After a cruise in the eastern seas, she entered, on the 11th of June 1864, the French port of Cherbourg to refit. Within a few days, the United States steamer *Kearsarge*, commanded by Captain Winslow, arrived at Cherbourg, and made a demonstration which the officers of the *Alabama* regarded and accepted as a challenge. The fight took place on Sunday, the 19th of June, outside the port of Cherbourg. Before the fight had lasted an hour, Captain Semmes found his ship was sinking, and gave orders to pull down his flag. See Admiral Semmes, *Service Afloat* (Lond. 1887).

The 'Alabama Question' was raised in the winter of 1862–63, when Mr Seward declared that the Union held itself entitled to demand full compensation for the damages inflicted on American property; and the divergence of view more than once threatened to issue in the gravest consequences to both nations. In 1871 a commission met at Washington; and by a treaty concluded there, provision was made for referring this claim to a tribunal composed of five arbitrators, of whom the Queen, the president of the United States, the king of Italy, the president of the Swiss Confederation, and the emperor of Brazil, were each to appoint one. The tribunal met at Geneva in December 1871, and by its final award Great Britain was ordered to pay a sum of £3,229,166; this sum covering also some responsibility for the depredations of the ships *Florida* and *Shenandoah*. The claim for indirect damage to American commerce was dropped. A court of commissioners was appointed by congress to adjudicate on 'Alabama claims,' sat from July 1874 to December 1876, and awarded $9,316,120 (£1,863,224). A second court (1882–85) disposed of the remainder of the money to further claims.

Alabaster, a variety of Gypsum (q.v.) or Selenite (q.v.). Chemically, these are all forms of the hydrated sulphate of calcium (hydrated sulphate of lime). Anhydrite (q.v.) is anhydrous sulphate of calcium. Both alabaster and anhydrite are used as ornamental stones. Alabaster, though softer, resembles marble in general appearance. When free from foreign substances, it assumes a finely grained structure, is of a pure white or delicately tinted colour, and is beautifully translucent. Of this class is the celebrated alabaster of Volterra in Tuscany. But it is often elegantly veined, striped, or spotted. Great numbers of beautiful statuettes, and ornaments of different kinds, are made of this material in Italy. It is found of good quality in Derbyshire, where it is also worked up into ornaments. Alabaster is slightly soluble in water, so that it is unsuitable for external work; but it does well for internal panelling or other decoration, the only drawback being the difficulty of finding it in large pieces.

Oriental Alabaster is a stalactitic carbonate of calcium (carbonate of lime), a mineral substance different from and harder than ordinary alabaster. It is really a variety of marble, and is found in Egypt, where it was worked in ancient times for urns, jars, and the like. The same kind of rock, which is sometimes extremely beautiful, is found in other parts of the world.

The name alabaster is said to be derived from the name of a town in Egypt where this kind of stone was abundant, and was manufactured into pots for perfumes. Such pots were called *alabastra*, even when made of other materials.

Alacoque, Marguerite Marie, a French nun (1647–90), the founder of the devotion of the Sacred Heart (q.v.).

Ala Dagh ('beautiful mountain'), a range in the great tableland of Erzerum, in Armenia, to the north of the Lake of Van. It attains an elevation of about 11,000 feet. On its northern slope rises the Murad, the eastern head-stream of the Euphrates.

Alago'as, a maritime state of Brazil, bounded on the N. and W. by Pernambuco. The country is mountainous in the NW., and low, marshy, and unhealthy on the coast. The chief productions are the sugar-cane, cotton-plant, manioc or cassava, ipecacuanha, maize, rice, &c., and also timber and dye-woods. Pop. (1920) 990,000. The town of Alagoas, once the capital, has now only some 4000 inhabitants. The present capital is the port of Maceio; pop. about 68,000.

Alais, a town of the French department of Gard, situated in a fertile plain, at the base of the Cevennes Mountains, 31 miles NW. of Nîmes by rail. It embraced the Protestant cause in the religious wars of France; and Louis XIII. and Cardinal Richelieu besieged and took it in 1629. Alais owes its prosperity chiefly to the mineral wealth of the surrounding district, which produces coal, iron, lead, zinc, and asphalt; there are large iron-foundries in the town and neighbourhood. There are also manufactures of silk and ribbons. Dumas the chemist was a native. Pop. 36,500.

Alajue'la, a city of Costa Rica, Central America, 23 miles WNW. of Cartago, and a little on the western side of the watershed between the Atlantic and the Pacific. It is connected with Cartago by rail. Pop. 12,000.

Alamanni, Luigi, Italian poet, was born at Florence in 1495, and having engaged in a conspiracy against Cardinal Giuliano, his patron, fled first to Venice, and then, on the accession of the cardinal to the papal chair, to France. In 1527 he returned to Florence. Finally, he settled in France, and was employed as a diplomatist by Francis I. and Henry II. He died at Amboise in 1556. His works (2 vols. Florence, 1859) include didactic, epic, and minor poems, much admired in their day. He influenced Wyatt.

Alameda, a town on the east side of the Bay of San Francisco, 9 miles ESE. of the city, practically a 'residential' suburb; pop. 29,000.

Al'amos, Los, a mining-town of Mexico, in the southern part of the state of Sonora, 45 miles E. of the Gulf of California; pop. 10,000.

Åland Islands, some 300 small islands and rocks in the Gulf of Bothnia, opposite Åbo, the largest (Åland, 18 miles long) being about 25 miles from the Swedish coast. Eighty are inhabited. The people are Swedes, skilful sailors and fishermen. Pop. about 19,000, two-thirds in Aland. The islands belonged to Sweden, but were taken possession of by Russia in 1809. The Emperor Nicholas constructed strong fortifications at Bomarsund, on the east side of Åland, which in August 1854 were destroyed by an Anglo-French force. New forts were destroyed after the Great War, when the islands were assigned to Finland by the League of Nations, though a referendum declared for Sweden.

Alans, a nomad race, of warlike equestrian habits, belonging to the great nation of the Sarmatians. First heard of in 65 B.C., they gradually spread northwards from the Caucasus to the Don and the Volga. In 375 they were conquered and scattered by the Huns; and many of them, in 411, with the Suevi and Vandals, invaded the Spanish peninsula, and settled in Portugal, whence in 429 they were ousted by the West Goths, and passed over to Africa.

Alapulai. See AULAPOLAI.

Alarcon, PEDRO ANTONIO DE (1833–91), Spanish author and politician, was born at Guadix, and was intended for the church, but early devoted himself to journalism. He served as a volunteer in the Morocco campaign (1859), entered the Cortes as Liberal deputy for his native town, and worked for the restoration of the constitutional monarchy in the person of Alfonso XII., who made him a councillor.

Alarcon y Mendoza, JUAN RUIZ DE, one of the most eminent of Spanish dramatists, born at the town of Tasco in Mexico, about the end of the 16th century. Little is known of his early life, but in 1622 we find him at Madrid, where he was appointed to the office of *relator* (reporter) of the royal council of the Indies. His first volume of *Comedias* appeared at Madrid in 1628; his second, at Barcelona, in 1634. Throughout his lifetime, and until his death, which took place in 1639, he was assailed in venomous lampoons by contemporary poets and dramatists. For his haughty scorn of his rivals and the public, the poet was rewarded by being neglected for generations, save by plagiarists, who found his forgotten works a safe and easy prey. He is now admitted to hold a place as a dramatist next after Calderon and Lope de Vega. His plots are ingenious, but natural; his style, chaste, but vigorous; and his works are marked throughout by rare elevation of feeling. He excelled in the heroic drama, the best specimens of this kind being *El Tejedor de Segovia.* His mastery in delineating character is shown in his character-comedies. The best known are *La Verdad Sospechosa* (imitated by Corneille in his *Menteur*) and *Las Paredes Oyen.* Of his comedies of intrigue, the best is *Todo es ventura.* A complete edition of his comedies was published at Madrid by Hartzenbusch (1848–52), and by Garcia Ramon (2 vols. 1884).

Al'aric I. (*Al-ric,* 'all rich') belonged to one of the noblest families of the Visigoths. He makes his first appearance in history in 394 A.D., as leader of the Gothic auxiliaries of Theodosius in his war with Eugenius; but after the death of the former, he took advantage of the dissensions and weakness that prevailed in the Roman empire to invade Thrace, Macedon, Thessaly, and Illyria, devastating the country (395). Rufinus, the minister of Arcadius, appears to have sacrificed Greece in order to rescue the capital, and Athens was obliged to secure its own safety by ransom. Alaric proceeded to plunder and devastate the Peloponnesus, but was interrupted by the landing of Stilicho in Elis with the troops of the western empire. Stilicho endeavoured to hem in the Goths on the Peneus; but Alaric broke through his lines, and escaped with his prisoners and booty to Illyria, of which he was appointed governor by the Emperor Arcadius, who hoped thus to make him a peaceful subject instead of a lawless enemy (399). The eastern emperor was also rendered jealous by the interference of the western empire in his affairs. In 402 Alaric invaded Upper Italy, and Honorius, the emperor of the West, fled from Rome to the more strongly fortified Ravenna. On the way to Gaul, Alaric was met and defeated by Stilicho at Pollentia on the Tanarus; but it was not till the following autumn that the result of the battle of Verona forced him to retire into Illyria. Through the mediation of Stilicho, Alaric concluded a treaty with Honorius, according to which he was to advance into Epirus, and thence attack Arcadius in conjunction with the troops of Stilicho. The projected expedition did not take place, yet Alaric demanded indemnification for having undertaken it; and Honorius, by the advice of Stilicho, promised him 4000 pounds of gold. When, after the death of Stilicho (q.v.), Honorius failed to fulfil his promise, Alaric advanced with an army, and invested Rome, which he refused to leave till he had obtained the promise of 5000 pounds of gold and 30,000 of silver. But neither did this negotiation produce any satisfactory result, and Alaric again besieged Rome (409). He took Ostia, and so stopped the food supplies of Rome. Famine soon compelled submission; and the senate allowed Alaric to appoint Attalus, the prefect of the city, emperor instead of Honorius. But Attalus displayed so little discretion, that Alaric obliged him publicly to abdicate. The renewed negotiations with Honorius proved no less fruitless than the former, and Alaric was so irritated at a perfidious attempt to fall upon him by surprise at Ravenna, that for the third time he advanced on Rome. His victorious army entered the city on August 24, 410, and continued to pillage it for six days, Alaric strictly forbidding his soldiers to dishonour women or destroy religious buildings. The prohibition served little to mitigate the horrors of the dreadful week. When Alaric quitted Rome, it was only to prosecute the conquest of Sicily; the occurrence of a storm, however, which his ill-constructed vessels were not able to resist, obliged him to abandon the project for the time; and his death, which took place at Cosenza, in Calabria, soon after (410), prevented his resuming it. He was but 34 years of age. Legend tells that, to hide his remains from the Romans, they were deposited in the bed of the river Busento, and the captives who had been employed in the work were put to death. Rome and all Italy celebrated the death of Alaric with public festivities; and the world enjoyed a momentary repose. But Alaric himself was much less barbarous than his followers. He admired those monuments of civilisation with which the Eternal City abounded, and sought to preserve them; he checked the excesses of his fierce soldiery, and at times gave indications that the lessons of Christianity which he had learned from the Arian missionaries had not been altogether forgotten. Yet through him, the Goths learned the way to Rome.

Alaric II., eighth king of the Visigoths, succeeded his father in 484 A.D. His dominions comprised all Gaul beyond the Loire and Rhine,

and most of Spain. He was an Arian, and this gave the orthodox Clovis, king of France, an excuse for making war on the heretic. Alaric's forces were completely routed near Poitiers, and he himself was overtaken and slain by the hand of Clovis (507). See GOTHS, CODE.

Alarm, or ALARUM (from Ital. *all' arme*, 'to arms'), is originally a call to arms, or the signal for this purpose, as the loud and hurried peal of an alarm-bell. Now it is commonly used of an instrument or apparatus for awakening sleepers—generally attached to a clock. It usually consists of a hammer and bell, with an escapement that lets it free at any hour arranged, when a spring or weight brings the hammer to bear on the bell.

Alarodian, a name used by Sayce for the group of languages of which Georgian is the type. See GEORGIA, CAUCASUS.

Ala-shehr (i.e. 'the exalted city,' ancient *Philadelphia*), a city of Asia Minor, 75 miles E. of Smyrna, at the NE. base of Mount Tmolus. It was founded by Attalus Philadelphus, king of Pergamos, about 200 B.C., and is famous as the seat of one of the Seven Churches of Asia. It is still a place of considerable importance, is the seat of a Greek archbishopric, and carries on a thriving trade in corn, tobacco, and cotton fabrics, chiefly with Smyrna, to which it is now joined by a railway. There are many interesting antiquities. Pop. about 15,000, including 3000 Greeks.

Alaska, a territory of the United States, occupying the NW. portion of the North American continent, together with all the islands near its coast, and the Aleutian Archipelago except Behring and Copper Islands. It is bounded on the N. by the Arctic Ocean, on the E. by the Canadian Territory of Yukon and by British Columbia, on the SW. by the Pacific Ocean, and W. by Behring Sea and the Arctic Ocean. Its land area is estimated at 590,900 sq. m. The northern portion consists essentially of a vast expanse of tundra, broken here and there by mountain-spurs (including the highest peak in N. America, Mount McKinley, 20,464 feet), and varied by countless lakes, water-courses, and sphagnous swamps. About one-third of this region lies within the arctic circle. Its winter climate is terribly severe, and the short summers are rendered almost unendurable by clouds of gnats. It is traversed by the great river Yukon, about 2000 miles long, which is said to discharge more water into the sea than the Mississippi, and by its main tributary the Tananah, the Kuskoquim, and other large streams. Its population is Innuit or Eskimo in the north and on the coast, but Athabaskan or Tinneh (Red Indian) elsewhere. The fisheries and the fur-trade afford subsistence to the scanty population. Commerce is much obstructed by the shallows which border the eastern shores of Behring Sea.

A second section comprises the Aleutian Islands (q.v.), and a great part of the peninsula of Aliaska. This division is mountainous, and actively volcanic; it is very thinly peopled by the Aleuts. The Pribylof Islands, in Behring Sea, are the main fur-sealing centre (see SEAL). The sea-otter (see OTTER) has been almost exterminated.

South-eastern Alaska, a narrow strip of land, along with the Alexander Archipelago, lies between Canada and the sea. The boundary as defined in the Russo-British treaty of 1825 is given as 'ten marine leagues from the ocean.' The exact meaning of this definition was disputed between Canada and the United States, especially after the discovery of gold in the Yukon valley gave more importance to the possession of a Canadian harbour on the coast. A joint commission in 1903 practically gave effect to the United States' contention, and fixed the boundary-line from the head of Portland Channel through Mount Whipple and Kate's Needle, round the head of Lynn Channel to Mount St Elias. This shuts out Canada entirely from the coast, but for a joint right to Portland Channel and the possession of two islands (Wales and Pearse) at its mouth.

The native animals of Alaska include the caribou or reindeer (120,000 head), the moose, the Rocky Mountain sheep, bears, wolves, foxes, sea-otter, and fur-seal. The most valuable food fishes are the salmon, halibut, and cod. The salmon-fisheries are of especial importance; the export of canned, cured, and fresh salmon to the U.S.A. exceeds £3,000,000 per annum. Off the coast are large kelp-beds. Hardy vegetables and cereals are grown, the grass crop is of some value, and the forests of south-eastern Alaska contain dense growths of coniferous timber, as yet practically untouched. But the great source of Alaskan wealth lies in its minerals, which, aside from gold, have been little exploited. Gold has long been mined at Juneau, and since 1885 many placer-deposits have been worked—the most valuable at Cape Nome and Cape York, in western Alaska, which have yielded largely since 1899. Other minerals include iron ore and copper and coal beds (both bituminous and anthracite) of extraordinary richness, as also platinum.

Alaska, formerly called Russian America, was first visited by the Russians under Vitus Behring in 1741; in 1799 the country passed under the control of the Russian America Company; in 1867 it was purchased from Russia by the United States for $7,200,000 in gold. Alaska was strictly a district, directly under the control of Congress, like the District of Columbia, until by Act of Congress, approved August 1912, it was made a territory with legislature of its own. White population in 1890, 4500; in 1910 the permanent population was 64,356, besides 7000 who came annually for a few months to work at mines, canneries, and railways; (1920) 55,036. The towns are all small, and most of them are on the coast. They include Juneau, capital since 1906 (pop. 3000); Sitka, the former capital (1000); Ketchikan (3000); Anchorage (2000); Skagway; Nome, on the west coast; and Fairbanks.

See BEHRING STRAIT; books by Woolman (1890), Wardman (1885), Elliott (1886), Seton Karr (1887), Sheldon Jackson, Scidmore (1893), Greely (1909), Stuck (1914, 1919).

Ala-tau ('mottled'), a name given to a range of lofty mountains forming the boundary between Turkestan and Mongolia, and the northern limit of the great tableland of Central Asia. It is made up of five sierra-like sub-ranges, the Zungarian, the Trans-Ili, the Kungeï, and the Terskeï Ala-tau, the fifth, running west, having been renamed by the Russians the Alexander Range. These are all grouped round Lake Issik-Kul (elevation, 5300 feet) as a central point. The mountains, which are principally of granite formation, range generally in elevation from 10,000 to 15,000 feet, and the loftiest peak, Khan Tengri, is 24,000 feet above the sea.

Alaternus. See BUCKTHORN.

Alatyr, a town in the Russian province of Simbirsk, on the Sura, 103 miles NW. of Simbirsk; pop. 11,000.

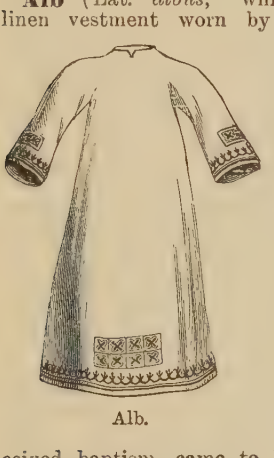
Alausí, a town of Ecuador, in the province of Chimborazo, 70 miles E. of Guayaquil, at an elevation of 7980 feet above the sea; pop. 6000.

Álava, the southern and largest, but most sparsely populated, of the three Basque provinces of Spain. The country forms a series of terraces of the Cantabrian Range, trending south to the river Ebro. The mountains are scattered through the whole province, and yield various minerals, stone, and timber in abundance. The climate is mild and

salubrious. Area, 1200 sq. m. The inhabitants (97,000), many of them Basques (q.v.), are engaged in agriculture. The soil is generally fertile, and along the Ebro fruits and wine are produced, while the other valleys yield good crops of maize and hemp. Cattle and sheep are grazed on the uplands; and a number of iron, asphalt, and salt mines are worked. The capital is Vitoria.

Álava, Don Miguel Ricardo de, a Spanish general, born of a noble family at Vitoria in 1771. At first a supporter of Joseph Bonaparte, he deserted to the winning side in 1811, and attracted the favourable notice of Wellington, who made him a general of brigade. Soon after the restoration of Ferdinand VII., Álava was appointed ambassador to the Hague. He returned to Spain in 1820 after the revolution, was sent as a deputy to the Cortes, and became a leader in the party of the *Exaltados*, voting for the suspension of the royal authority. The re-establishment of absolute monarchy in the Peninsula drove him a political refugee to Brussels and England, till, at Ferdinand's death (1833), he was recalled by the regent Maria Cristina, and sent on missions to London and Paris. He refused to swear to the revived constitution of 1812, declaring that he was tired of constantly taking new oaths; accordingly in 1837 he gave in his resignation, and retired to France, where he died at Barèges in 1843.

Alb (Lat. *albus*, 'white'), the long white linen vestment worn by priests and acolytes in the Roman Catholic and also the Anglican Church. It differed from the more modern Surplice (q.v.) in having narrower sleeves, and fitting more closely to the body, being bound about the waist by a cincture. At the foot and wrists were embroidered ornaments called *apparels*. In the ancient church, the newly baptised wore it for eight days, and hence catechumens were called *albati;* and the Sunday after Easter, on which they usually received baptism, came to be called Dominica in Albis. See Whitsuntide.



Alb.

Alba (ancient *Alba Pompeia*), a very ancient city of North Italy, in the province of Cuneo, on the right bank of the Tanaro, 41 miles SW. of Alessandria by rail. Alba is an episcopal seat; the cathedral was founded in 1486. Pop. 15,000.

Albace'te, capital of a Spanish province, 140 miles SE. of Madrid by rail, stands in a fertile but treeless plain. It has great cattle-fairs, and was formerly noted for the manufacture of knives and other steel goods. Pop. 25,000.—The province of Albacete is partly formed from the former kingdom of Murcia, and partly from New Castile. It is generally hilly, and in some parts mountainous, some of its mountains attaining an altitude of 5000 feet; but it contains also rich plains and fertile valleys. The area of the province, which has much mineral wealth, is 5800 sq. m.; pop. 260,000.

Albacore. See Tunny.

Alba Longa, the most ancient city of Latium, situated on the rocky ridge that runs along the eastern shore of the Alban Lake, between it and the Alban Mount. According to legendary history, it was built by Ascanius, the son of Æneas, about 300 years before the foundation of Rome, which is represented as a colony of Alba Longa. Notwithstanding this, the Romans, under Tullus Hostilius, destroyed the city, and removed the inhabitants to Rome. It seems certain that Alba Longa was an important city long before the existence of Rome, and the head of a confederation of Latin towns, and that when it was destroyed many of its inhabitants settled at Rome. Traces of its walls may yet be seen. See Albano.

Alban, St, the first martyr of Britain. See St Albans.

Albani, Francesco, a painter of the Bolognese school, of the time of the Caracci, was born at Bologna in 1578, and died there in 1660. He studied, along with Guido Reni, first under Calvaert, and afterwards under Ludovico Caracci. He painted about forty-five altar-pieces; but his bent inclined him more to the representation of idyllic scenes from ancient mythology or from contemporary pastoral poetry. He had by his second wife a family of twelve children of extraordinary beauty, in whom he found exquisite models for his Venuses, Galateas, and angels' heads. His representation of the Four Seasons was often imitated.

Albani, Madame (Emma Lajeunesse), singer, was born 1st November 1852 at Chambly, in Canada, and, trained in music by her father, at the age of fourteen was soprano in a Catholic church at Albany—whence her professional name of 'Albani.' She studied afterwards at Paris and Milan, and in 1870 sang in opera at Messina with a success that attended her everywhere in oratorio as in opera. In 1878 she married Ernest Gye, impresario. See her autobiographical *Forty Years of Song* (1911).

Albania, the Byzantine name for the country called by its inhabitants Shkyperia or Shkypeni, is one of the latest of the principalities or states to be carved out of the wreck of the Ottoman empire, though its people are the oldest in the Balkans and among the most ancient in Europe. The new state, whose frontiers were approximately settled by the Conference of London in 1913, possesses a fairly valuable strip of sea-coast on the eastern shores of the Adriatic, stretching from the mouth of the Boyana in the north to Pagania, opposite Corfu, in the south; but the interior is rocky and generally worthless.

Two-thirds of the way up the Boyana the frontier strikes north across Lake Scodra to the Hoti and Castrati inlets on the east, leaving the Tarabosh to Albania, but on the other side of the lake giving the Albanian tribes of Hoti and Gruda to Montenegro. For some miles the old frontier is followed, and then the line strikes south by east to include the Moslem-Albanian towns of Gussigne and Plava in Montenegro. The frontier then goes south-east along the watershed of the White Drin, leaving Ipek, Jacova, and Prisrend, all predominantly Albanian towns, to Montenegro and Serbia, and turns almost due south to Lake Ochrida, including the Liuma district in Albania, but depriving it of Dibra and the Reka valley, from which the Shkypetars were exterminated by the Serbians in the war of 1912. From Lake Ochrida the frontier is even less carefully drawn, but it includes Biklishta in the new state, and then runs south-west in a zigzagging line to Pagania, on the coast opposite Corfu, thus depriving Albania of Yanina, the town and country ruled, in defiance of the sultan, by the famous Albanian, Ali Pasha of Tepelen.

The new state thus delimited contains 11,317 sq. m., and a population of about a million, or about half the area and rather more than half the population it justly should contain; and even these remnants of a rocky patrimony are coveted by Greeks in the south and by Slavs in the north.

The principal towns are Scodra (usually called Scutari in Europe), the metropolis of North Albania, with a mixed Moslem and Roman Catholic population of about 35,000 inhabitants—it is a purely Albanian city, and is the seat of the ancient Roman Catholic archbishopric of Dioclea; Durazzo (3000), the capital of the short-lived reign of the mpret, the future commercial port of the country; Tirana, the emerald city (12,000), the centre of influence wielded by the late Essad Pasha and the Toptani family; Elbassan (8000), an important Moslem town; Berat (15,000), the white city; and Avlona (5000), the seaport which gives Albania its strategical importance and is the centre of Italian influence and propaganda.

The principal rivers are the Boyana, the outlet for Lake Scodra; the Drin, the most important river of Albania but an unregulated mountain torrent; the Mati, the Ishmi, the Arzen; the Skumbi, which separates North and South Albania; the Semeni with its two branches, the Devoli and the Osum; and the Voyussa, the second river in size, into which flow the Zrinos and the Susitza. All these streams wind through the mountains of the interior to the marshes of the sea-coast, and are of little or no use as means of navigation. Of the Albanian lakes, Yanina, Presba, and Vintrok are completely lost; of Scodra only the south-east corner is left, and of Ochrida only the south-west. The lagoons of Kravasta, Soli, Valona, and Butrinto, and the rest along the coast, are nothing but sources of fever, and need draining first of all.

Generally speaking, the country is a mass of mountains sloping down to the sea. In the north the mountains are known as the Albanian Alps, and are said to reach about 9000 feet south of Gussigne, though the imposing-looking summits above Scodra, Mounts Zuccali and Maranai, only attain to 5500 feet and 5000 feet respectively. The Shah Dagh is now lost to Albania, and with it some of the highest peaks, for the branch running south on the left bank of the Drin above Dibra seldom rises above 3000 feet. In Central Albania Mount Tomor is about 7000 feet high, and farther south Mount Cica, the highest peak of the Acroceraunian Mountains, rises to something like 6000 feet.

The Albanians—or Shkypetars, as they are properly called—are the remnants of a race which inhabited the Balkans at the dawn of history, and are of pure Aryan stock. They are a blonde race, far whiter than the Serbs, the Bulgars, or the Turks, all of whom came out of Asia centuries afterwards. They represent the Thrako-Illyrian tribes who held the main part of the Balkans when the Hellenes of classic times occupied the Peloponnesus and the peninsula above it. From very early times the division into Ghegs in the north, or Illyria, and Tosks in the south, or Epirus, seems to have prevailed, and the two parts speak slightly different dialects of their ancient tongue, which in the north has been corrupted by Slav words, and in the south by Greek. The name Shkypetar is derived by some from *shkip*, a rock, and thus signifies Hillmen; while others derive it from *shkyup*, an eagle, signifying Sons of the Eagle. This latter seems more in accordance with ancient tradition, as the Shkypetars since the days of Pyrrhus have always boasted themselves to be the Sons of the Mountain Eagle. Moreover, they have adopted an eagle as the emblem of the new state.

The Shkypetars were very early converted to Christianity—indeed, St Paul himself is said to have founded the Church at Durazzo; but when the schism occurred North Albania adhered to the Pope of Rome, and South Albania to the Byzantine Patriarch. On the coming of the Turks large numbers, especially in Middle Albania, embraced the Moslem faith, and as a rule the chiefs, except the Bib Dodas of Mirditia, adopted the religion of the new conquerors for business reasons.

The North Albanians are divided into many tribes. On the Montenegrin frontier are the Malisors, the chief tribes of whom are Hoti and Gruda, now recklessly assigned to Montenegro, and Castrati, Clementi, and Skreli. Towards Prisrend are Pulati, Shoshi, and Shalla and Liuma, to the south of whom are the mountains of the great Roman Catholic Mirdite tribe. Round Scodra and in the Zadrima are a number of very small tribes or families, but in Middle Albania and South Albania the tribes are much fewer in number, and are really comprised in the Tosks proper and the Lapides. The towns are more numerous than in North Albania, and the Beys and Aghas exercise a feudal sway over the people, whereas in North Albania the tribal council is the central power. The southern Tosks have been erroneously or dishonestly claimed as of Greek nationality because they are of the Greek religion; but, on the other hand, a number of them emigrated in times past to Greece, and there are probably not far short of 100,000 people of Albanian descent in Greece and the islands. About the time of Scanderbeg several Albanian colonies were founded in south Italy and Sicily, and there are now some 200,000 settlers of Albanian blood in Italy. Several statesmen have been contributed to the Italian kingdom by these colonists, and it must not be forgotten that Mehemet Ali Pasha, who founded the dynasty of the Khedives in Egypt, was an Albanian. In the Ottoman empire many grand viziers and famous pashas were purebred Shkypetars. Altogether, inside and outside the new state of Albania there are over 2,000,000 Shkypetars, of whom 1,000,000 are Moslems, about 600,000 Orthodox, and 400,000 Latins.

Albanian is a very old Indo-European tongue, and is the descendant of the Thrako-Illyrian language of classical times. But it is a very poor language, and is eked out by words derived from Latin and others borrowed from Turkish, Greek, and Slav. It has only recently been given an alphabet, or rather three, for the Latin alphabet has been introduced by the Roman Catholic priests in the north, the Greek alphabet by the orthodox clergy in the south, and latterly the Turkish script had been enforced in the Turkish schools. None of these forms of writing completely suits Albanian, and various modifications have had to be made in the letters to express the Albanian pronunciation. Albanian cannot be said to possess any literature, only legends and folk-songs; and if any Albanians write, they use Italian or, in some cases, French.

Formerly the costumes of the Albanians were exceedingly picturesque, and every tribe had its distinguishing dress, but now the tendency is to adopt the commonplace but commodious clothing of Europe. Generally speaking the Moslem townsmen wear the fustanelle, or full white linen petticoat, and the women of the towns Turkish dress. In the mountains the women go unveiled, and wear skirts of red cloth embroidered with black, and the men wear a tight-fitting suit of white felt ornamented with black embroidery. But the fustanelle is being discarded as too inconvenient, and in the coast-towns the slop suits of Trieste and Italy are ousting the mediæval costumes.

The natural allies of the Shkypetars are the Greeks, the nearest non-Slav race; and from the earliest times the two countries seem to have been allied, for Clinicus, king of Illyria, is said to have sent seventy-two ships with the Greeks to the siege of Troy. At the beginning of the 6th century Illyria was overrun by the Kelts, and this was the first of the invasions of the Balkans of which we have any record. About 360 B.C. Bardyles, king of Illyria, conquered Epirus and invaded Mace-

donia, but was defeated by Philip of Macedon, father of Alexander the Great, and his country annexed as far north as Durazzo. The Shkypetars formed part of the army which invaded Persia and India under Alexander the Great; and after his death the country, with Scodra as its capital, regained its independence, conquered Epirus and Corfu, and fought against the Ætolian League, about 250 B.C., under King Agrom. Teuta, the widow of Agrom, came into collision with Rome, with the result that the land was placed under the protection of the Republic. During the Macedonian wars the Shkypetars wavered between Macedonia and Rome; but Gentius, the last king, not only allied himself with Perseus, but turned pirate, so in 168 B.C. the prætor Amicius captured Scodra and took Gentius and his sons prisoners. Illyria and Epirus were made Roman provinces, and the walls of all the cities of Epirus were destroyed. Only the towns along the coast were allowed to exist; but though the Via Egnatia was driven through the country, the mountaineers were left semi-independent. During the wars between Cæsar and Pompey, and Antony and Octavius, Durazzo and Valona were ports of the highest strategical value, but under the Empire both Illyria and Epirus were utterly neglected.

In 395 A.D. the lands of the Shkypetar were allotted to the Eastern empire, and the prefects of Byzantium ruled in the lowlands, while the tribes of the interior were as independent as they were in after-times under the Turks. At the opening of the 5th century Alaric with his Goths, and later on the Huns and the Ostrogoths, ravaged the country; but the Slavs, who invaded the empire in numbers at the end of the 6th century, were the first barbarians who came to settle. They scattered the semi-civilised Thrako-Illyrian tribes before them by their locust-like invasion, and drove them into the mountains of the west; and the Albanians, or Shkypetars, are now the remnant left of the old race, between whom and the invading Slav there is undying hatred. The Bulgars followed, and the history of Albania until the coming of the Turks may be summarised as consisting in the occupation of the coasts and plains by the Byzantines, Serbs, and Bulgars in turn, while the native Shkypetars maintained a wild independence in their mountains. Simeon and Shishman the Bulgars, the Emperor Basil Bulgaroktonos, Stefan and Dushan the Serbs, and again the emperors of Byzantium, in turn held sway in Shkyperia until the coming of the Turks, when native princes and Venice shared the overlordship at various times. In 1467, when Scanderbeg the Shkypetar hero died, and the land fell under the Ottoman empire, the pashas ruled like the Byzantine prefects, but the law of the tribes prevailed in the mountains. In the 18th century the North Albanians were ruled by native pashas, and the South Albanians at the beginning of the 19th century by Ali Pasha of Yanina, the Mirdites and the Albanians of the centre also having their native rulers. Government from Constantinople direct was not introduced until after the Crimean war, and in 1878 the Albanian League was founded, which was directed against all enemies of the Shkypetar nationality, including the Turks, but was unable to prevent the cession of Dulcigno to Montenegro.

When the 'Constitution' was promulgated in 1908 the Shkypetars thought that it meant independence, but they soon found that the Young Turks meant to destroy their nationality, and in 1910 the tribes rose against the government. During the Balkan wars the Shkypetars as a rule took a passive part, as they could not join the Allies and would not fight for the Young Turks; but Scodra was captured by the Montenegrins, Yanina by the Greeks, and Durazzo by the Serbians, who also massacred the villagers wholesale in North Albania. The new state was outlined at the Conference of London in 1913, and on 7th March 1914 Prince William of Wied, the newly chosen king, or mpret, of Albania, landed at Durazzo with his wife and staff. He was singularly ill-fitted to rule over the free Shkypetars, for, though in appearance he was the ideal warrior, in mind he was a German bureaucrat. After nearly six months of stormy life at Durazzo, the prince finally left his kingdom on 3d September 1914, and returned to Germany to fight for the Kaiser. Albania relapsed into the rule of local and tribal chieftains, and on 30th October Italy occupied the rocky islet of Saseno, off Avlona, and Greece a day or two later annexed Epirus.

Until the coming of the Austrians, Mirditia remained under its native prince, Prenck Bib Doda (murdered in 1919); Durazzo and Central Albania under the rule of Essad Pasha (murdered in Paris, 13th June 1920); and Valona under the International Commission of Control. South Albania was occupied by the Greeks, and Scutari governed by a mixed commission of Moslem and Roman Catholic townsmen. When the Austrians swept through Serbia and Albania they advanced almost to Avlona, the country round which was occupied by the Italians; but when the Allies broke Bulgaria in 1918, they advanced through Albania in their turn. The people strongly resented the occupation by the Italians, and fought against them round Avlona in 1919. In 1920 the Italians decided to retire from the country, and the Albanians, after their experiences in the Great War, made a truce among themselves, and formed a government at Tirana which was representative of the whole of Albania. A constitution, adopted in 1920 and modified in 1922 and 1925, makes Albania a republic with a president and a two-chamber assembly, but whether this arrangement will be lasting remains to be seen. Some form of central government, with large powers left to the local authorities, seems the best solution, and in course of time some sort of an alliance with Greece, when that country settles down and can remember to treat the Albanians on equal terms. Italy, Greece, and Albania will have to come to an understanding, for, with the exception of Rumania, they are the only non-Slav races in the Near East, and must form an alliance if they are to continue to exist.

Consult the works of Von Hahn, Jaray, and Galanti; *High Albania* and *The Struggle for Scutari*, by M. E. Durham; and *Albania, the Foundling State of Europe*, by Wadham Peacock.

Alba'no, 18 miles SSE. of Rome, on the declivity of the lava-walls which encompass Lake Albano, and opposite the site of Alba Longa (q.v.), is the seat of a bishop, and has many remains of ancient buildings. A fine wine is made. Pop. 9000.

The ALBAN LAKE, or Lago di Castello, is formed in the basin of an extinct volcano, and has a circumference of 6 miles, with a depth of 530 feet. Its surface is 961 feet above the sea-level. While the Romans were at war with Veii (390 B.C.), this lake rose to an extraordinary height in the heat of summer, and diviners declared that the conquest of Veii depended upon letting off the waters. Thereupon the Romans opened a tunnel through the lava-wall. The tunnel, which still fulfils its office, is a mile long, 7 feet high, and 4 feet wide. On the eastern bank of the lake rises Monte Cavo (Mons Albanus), 3000 feet high.

Al'bany, or ALBAN, an ancient name for the Highlands of Scotland. Etymologically connected with the Gaelic *alp*, 'a high hill,' and the Lat. *albus*, 'white,' it is the Gaelic form of the Cymric *Albion*, a term applied to the entire British Island

in a treatise on the World, once ascribed to Aristotle. It may, indeed, be pretty safely assumed that Albion or Albany was the original name of Britain among its Celtic population; and we know that from the close of the 9th till the beginning of the 11th century Pictavia, or the kingdom of Scone, was known as the kingdom of Alban. In 1398 the title of Duke of Albany was conferred on the brother of King Robert III., then regent. Forfeited by his son, it was conferred on Alexander, second son of James II., in the person of whose son, John, it became extinct in 1536. It was conferred in succession on Darnley, on Charles I. in infancy, on James II. in infancy, and (as a British title) on Frederick, second son of George III. Prince Charles Stuart assumed the appellation of Count of Albany as an incognito title, and gave the title of Duchess of Albany to his legitimated daughter. The title, restored in 1881, was conferred upon Prince Leopold (1853–84), whose son (Duke of Saxe-Coburg) was deprived of it by act of parliament (1917).

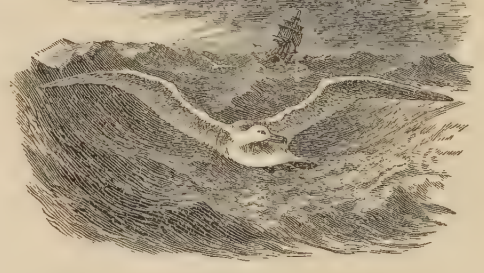
Albany, a city of the United States, capital of the state of New York, seat of justice of Albany county, and a most important railway and commercial centre, stands on the west bank of Hudson River, 145 miles N. of New York city. The river is an important channel of commerce, which is further facilitated by the Erie and Champlain Canals. Six important railway lines centre in this city. The older streets are irregularly laid out. The city has a copious water-supply, and excellent drainage and sewerage systems; inter-urban electric railways connect it with adjoining cities. Albany has a state library and education department, a fine city-hall, a high-school, one large public park and nearly twenty smaller ones, besides boulevards and avenues; a celebrated county-prison; Roman Catholic and Episcopalian cathedrals, and many other handsome churches; fine banks and clubs, several 'academies' and private schools, a noted state normal school, schools of law, medicine, and pharmacy (of Union University, Shenectady); an astronomical observatory, various hospitals and infirmaries, a large United States government building, and a very costly and splendid state capitol, considered the finest building of its class in the whole republic. Three bridges and several ferries cross the river to the suburban town of Rensselaer (formerly Greenbush). Albany has a large trade in timber, grain, and cattle. Leading articles of manufacture are farming implements, boots and shoes, bricks, wagons, clothing, flour, stoves, castings and hollow-ware, furniture, tobacco, cigars, musical instruments, and stationers' goods. The situation of Albany at the connection of so many important railways and of two great canals with tide-water makes it a great place for the handling or transfer of the bulky staples of interior production. A specialty in the trade of the city is the handling of barley. It is one of the largest seats of the manufacture of cast-iron stoves and heating apparatus; and its ales and beer had formerly a great celebrity. The hilly and irregular site of the town greatly facilitates drainage. The winter climate of Albany is severe for its latitude. The extensive cattle-markets of this city are situated at West Albany, where there are large railway-shops. Near the site of Albany the Dutch founded a block-house and fur-trading station in 1614. The Dutch villages of Beverwyck or Fort Orange (1618) and Willemstedt (1646) were the germs of the present city. The Dutch colony was ceded to Great Britain in 1664, and the town took its present name in honour of the Duke of York and Albany, afterwards James II. of England, who received a grant of the colony. In 1686 a city charter was granted to Albany, which is thus the oldest chartered city in the United States. In 1764 the first general congress of the English colonies assembled here. The city long retained many quaint Dutch characteristics. Pop. (1800) 5349; (1830) 24,209; (1900) 94,151; (1920) 113,344.

Albany, in Western Australia, on one of the most sheltered inlets of King George's Sound, was first occupied in 1826 to anticipate a supposed intention of the French government to seize that part of Western Australia. The harbour is good but small. For many years it was a port of call for the mail-boats to and from England, but has now been superseded by Fremantle (q.v.); the mail-boats to and from South Africa still use it. It is connected by rail with Perth, 352 miles away. The climate of the district is exceptionally fine, and the scenery pleasing, so that it has become a health and pleasure resort. Pop. 4000.

Albany, Louisa, Countess of, was born in 1752, the daughter of Prince Gustav Adolf of Stolberg, who fell in the battle of Leuthen (1757). A bright, merry girl of nineteen, in 1772 she was married to Prince Charles Edward, no longer 'bonny,' and no longer 'young,' but a selfish worn-out sot. No children came of the marriage; and in 1780, to escape from ill-usage, the countess sought refuge in a nunnery. Three years later she obtained a separation; both before and after her husband's death (1788) she lived with the poet Alfieri (q.v.), and on his death (1803), with a French painter, Fabre; but it was by the poet's side, twenty-one years later, she was buried (1824) in the church of Santa Croce at Florence. See Reumont's *Gräfin von Albany* (2 vols. Berl. 1860), and Vernon Lee's *Countess of Albany* (1884).

Albany, The, bachelor quarters let out in chambers (to Canning, Byron, and Macaulay in their time), are on the north side of Piccadilly, a little beyond Burlington House.

Albatross, or Albatros, a name applied to the larger Diomedeidæ, a family closely related to the petrels, but not even distantly to the gulls. An albatross may be at once distinguished from a large gull by the curious tubular, not slit-like, nostrils. The largest and best-known species is the wandering albatross (*Diomedea exsulans*) of the southern ocean, which may measure 11 feet 4



Albatross.

inches from tip to tip of its outspread wings. The plumage is mostly white, mottled above by wavy bars, and with brownish-black quill feathers on the wing. The strong flight is particularly interesting because of its fine exhibition of 'sailing'—that is, of moving for a long time without any perceptible stroke of the wings, either with or against the wind, close to the water or at a considerable height. In this way it wheels in great circles round

the ship. The albatross is very voracious, feeding on fish, cuttlefish, jellyfish, and the like, and it is said to gorge itself sometimes so heavily with dead whale that it is unable to rise from the water. The nesting-places are solitary islands with high plateaux, and large numbers nest together. A single white egg is laid in a slight hollow on the top of a mound of mud and vegetable matter; the development is slow, and the young birds are for a long time dependent on their parents. It is to be regretted that the colonies are sometimes ruthlessly disturbed, and that the magnificent bird, whose flesh is unpalatable, is often shot at by travellers, in spite of Coleridge's *Ancient Mariner*. Besides *D. exsulans* there are about fifteen species of albatross—e.g. *D. albatrus* and *D. brachyura* of the North Pacific, and the sooty albatross (*Phœbeteria fuliginosa*) of the far South. A black-browed albatross (*D. melanophrys*) was captured in Cambridgeshire in 1897. The sailor's name for the smaller species of albatross is 'mollymawk.' The name seems to be a modified form of Alcatras, a Portuguese word for the bucket of a water-wheel; applied first to the pelican, then to the frigate-bird, and then, modified in spelling, to the bird above described.

Albay, capital of a fertile province, constituting the south end of the Philippine island of Luzon, near the Bay of Albay. Manila hemp is shipped to Manila, and cocoa, copra, and sugar are exported. Pop. 43,000.

Albemarle, the English form of Aumale (q.v.), in Normandy, whose first earl, Odo, received from his brother-in-law, William the Conqueror, a lordship in Yorkshire. Both lordship and title reverted to the crown in the reign of Henry III.; and four times subsequently was the dukedom of Albemarle conferred on four different persons—as in 1423 on Richard Beauchamp, Earl of Warwick, and in 1660 on his *soi-disant* descendant, General Monk (q.v.). It expired with his son in 1688; and in 1696 the title of Earl of Albemarle was granted to Arnold Joost van Keppel (1669–1718), a devoted follower of William III., who in 1703 joined the forces of the Allies, fought at Ramillies, Oudenarde, and Lille, and led Marlborough's second line in 1711. Among his descendants have been William, second earl (1732–54), soldier and diplomatist; George, third earl (1724–72), who captured Havana; and George Thomas Keppel, sixth earl (1799–1891), who fought at Waterloo, served at the Cape and in India, and rose to be general in 1874. He was private secretary to Lord John Russell as premier, sat as a Whig M.P. in 1847–49, and succeeded to the title in 1851. He wrote *Fifty Years of my Life* (1876).

Albemarle Sound, a rather shallow inlet in the north coast of North Carolina, United States, running inland for 60 miles, with a breadth of from 4 to 15 miles.

Alberoni, GIULIO, cardinal and statesman, was born in 1664 at Firenzuola in Parma, the son of a poor vine-dresser; but his great abilities led to his being carried by the Duc de Vendôme, as secretary, to France and Spain. In 1713 the Duke of Parma employed him as his agent in Madrid, and here he quickly gained the favour of Philip V. of Spain. He at first made use of the influence of the Princess Orsini, then hoodwinked her into promoting the king's marriage with Elizabeth Farnese, who as queen at once demanded the banishment of the princess. Alberoni now (1714) became prime minister of Spain, and was made a cardinal by Clement XI. three years later. He did much to develop the resources of Spain and encourage industry and economy, while he remodelled the army and the fleet, and increased the foreign commerce. To gratify the queen he suddenly invaded Sardinia, in violation of the Peace of Utrecht. This unexpected audacity made England, France, Austria, and Holland form, in 1719, the 'Quadruple Alliance.' But Alberoni, though responsible for a succession of Spanish disasters, was not dismayed. Even when the Spanish fleet in the Mediterranean was destroyed by an English one, he contemplated an extensive war by land, in which all the European powers would have been entangled. He patronised the Pretender to annoy England, and the French Protestants to annoy Louis. He sought to unite Peter of Russia and Charles XII. with him, to plunge Austria into a war with the Turks, to stir up an insurrection in Hungary, and to bring about the downfall of the regent in France. But Philip lost courage, and concluded a treaty of peace, the chief condition of which was that the cardinal should be dismissed. He was ordered to leave Spain without delay (1719), the queen herself consenting to his banishment. He fled to Italy, where, threatened with imprisonment by Pope Clement XI., he hid in a monastery at Bologna (1720). On the death of the pope in 1721, he repaired to Rome, and took part in the election of Innocent XIII., who, like his two successors, befriended the great exile, though on the demand of Spain he imprisoned him for a while. Alberoni was even proposed as candidate for the papacy, but soon retired to Piacenza, and spent his remaining years in watching over a seminary which he had founded and endowed. He died there June 1752. See Lives by Bersani (1862) and Bianchi (1901).

Albert, dukes of Austria and emperors of Germany. See AUSTRIA, GERMANY.

Albert (1490–1545), Archbishop of Magdeburg and Elector of Mainz, was younger son of the Elector of Brandenburg. Leo X. having granted him permission to sell indulgences, Albert appointed the Dominican Tetzel as his agent, who, by the shameless manner in which he went about his work, first roused the wrath of Luther. A friend of literature, he was not originally unfriendly to reformation; but he ultimately sided strongly against the Reformers.

Albert (1490–1568), last grand-master of the Teutonic Knights (q.v.) and first Duke of Prussia, was a younger son of the Margrave of Anspach. Elected grand-master in 1511, he embraced the Reformation, and, by Luther's advice, declared himself secular Duke of Prussia (q.v.).

Albert, PRINCE CONSORT OF ENGLAND, was born at Schloss Rosenau, near Coburg, August 26, 1819, the younger son of the Duke of Saxe-Coburg-Gotha, by his first marriage with Louisa, daughter of the Duke of Saxe-Gotha-Altenburg. After a careful domestic education, the Prince, along with his elder brother, studied at Brussels and Bonn (1836–38), where, in addition to the sciences connected with state-craft, he devoted himself with ardour to natural history, chemistry, painting, and music. He attained expertness in all knightly exercises; whilst by Baron Stockmar, his mentor, he was imbued with a real interest in European politics. Queen Victoria and he met first in 1836, and fell in love, though the marriage had long been projected by King Leopold and Baron Stockmar. It was celebrated in London on the 10th of February 1840, when Prince Albert received the title of Royal Highness, was naturalised as a subject of Great Britain, and obtained the rank of Field-marshal. The title of Consort of Her Most Gracious Majesty was conferred in 1842, that of Prince Consort in 1857. With rare prudence and tact he abstained from conspicuous intervention with state affairs; but the publication of the Queen's letters (in 1907) proved that he strongly

supported the Queen in her efforts to strengthen the influence of the crown and direct British policy in a direction hostile to Italian and other nationalist aspirations. When the Whig ministry of 1840 proposed for him the income of £50,000, the Tories, in conjunction with the Radicals, limited the sum to £30,000. The Prince opened for himself an influential sphere of action in the promotion of science and art, and as patron of useful and philanthropic associations; and he completely succeeded in living down the insular jealousy of the foreigner, which was for a time rather strongly manifested. The Exhibition of 1851 owed much to his strong interest. In Continental politics his ruling idea was that Prussia should be supreme in Germany. Balmoral (q.v.) was bought by him for the Highland home of the royal house. He died of typhoid fever at Windsor Castle on the 14th December 1861; and sorrow for his death darkened the life of his bereaved widow, and largely withdrew Queen Victoria from public life.

See his Life by Sir Theodore Martin (5 vols. 1874–80), and Count Vitzthum's *Reminiscences* (Eng. trans. 1887). For his careful but not wholly judicious training of his eldest son, see the article on Edward VII. in the 1912 Supplement to the *Dictionary of National Biography*. For the rest, see the article VICTORIA, and books there cited.

Albert is a river of Queensland flowing 200 miles to the Gulf of Carpentaria; a county in South Australia, on the Murray; a county in New Brunswick, on the Bay of Fundy; and a district in the Cape Province of South Africa.

Albert was the name by which Alexandre Martin (born 1815), socialist, was commonly known. He was conspicuous in the 1848 Revolution, an associate of Louis Blanc (q.v.), promoted the Ateliers Nationaux (q.v.), was a member of the provisional government, and for joining in an *emeute* was next imprisoned, and last heard of as a Communard during the siege of Paris in 1870.

Alberta, a province of the Dominion of Canada, is bounded on the south by the 49th parallel of north latitude, on the west by British Columbia, on the north by the 60th parallel of north latitude, on the east by the 4th meridian in the Dominion system of land surveys (110° west longitude). Land area, 252,925 sq. m.; water area, 2360 sq. m.; total area, 255,285 sq. m., more than twice as large as Great Britain and Ireland, and larger than any European country except Russia. It is a vast plateau along the eastern ridge of the Rocky Mountains, 3000 feet above the sea at its southern boundary, and sloping to a level of less than 1000 feet along its northern limit. The southern half of the province is a treeless, undulating prairie, scored by deep river-valleys and covered with a rich chocolate soil well suited for agriculture. The northern part is more varied, comprising stretches of forest along the rivers and lakes; hills and level plains covered with numerous and extensive groves of spruce, aspen, poplar, and willow, or tall rank grass and flowers, giving the landscape a pleasing and park-like appearance. Two of the largest river systems of North America traverse the plains of Alberta—the Saskatchewan and the Peace. The Saskatchewan drains the southern half of the province eastward into Lake Winnipeg, the waters of which finally reach Hudson Bay *viâ* Nelson River. It has two large branches, the North Saskatchewan, 760 miles long, with its tributaries, the Battle, 500 miles, and the Brazeau, 150 miles; the South Saskatchewan, 865 miles long, with its tributaries, the Belly, 180 miles, the Bow, 315 miles, and the St Mary's, 120 miles. Peace River, 1065 miles long, and the Athabasca, 765 miles long, form part of the great Mackenzie system, and drain the northern half of Alberta into the Arctic Ocean. The Smoky, 245 miles, and the Little Smoky, 180 miles, are the largest tributaries of the Peace. The Pembina, 210 miles, flows into the Athabasca, the latter joining the Peace at Lake Athabasca. Both the Peace and Athabasca are navigable for hundreds of miles, and freight-boats make regular trips in summer.

The population of the territory that is called Alberta to-day was 18,075 in 1881. At the census of 1891 it was 22,277; of 1901, 73,022; of 1906, 185,412; of 1921, 581,995, a large majority of whom were males. In 1906 the nationality of the population was as follows: Canadians, 86,818; British, 24,320; United States, 43,251; foreign, 30,418. The principal cities are Edmonton, the capital of the province, population 54,000; Calgary, 57,000; Lethbridge, 10,000; Medicine Hat, 10,000; Strathcona; Wetaskiwin.

The province was organised in 1905 by the Alberta Act, whereby provincial autonomy was established in the Canadian Confederation. The government is administered by a Lieutenant-governor appointed by the Dominion government for a term of five years, acting by the advice of the Provincial Executive of four members, directed by the Legislative Assembly, elected every four years by male and female suffrage. Representation in the local and federal parliaments is readjusted every five years to give adequate representation by population. Education is provided for by a free system of common schools, a provincial Normal School for the training of teachers, and the state university, opened in 1908, and having 335 students in 1916–17.

Agriculture is the chief industry of Alberta; though ranching is carried on, especially in the foothills of the Rocky Mountains. Over 100,000,000 acres are fit for cultivation; about 8 per cent. was in 1919 under crop. The soil is very fertile, being composed of a marly clay subsoil deeply covered with humus well adapted for growth of cereals, clovers, and vegetables. Great attention is paid to the breeding of horses and cattle. The luxuriant grasses, pure and abundant water, and dry winter climate constitute favourable conditions for live-stock. Creameries, factories, and farm dairies in the province produced in 1917 23,000,000 lb. of butter and 1,278,000 lb. of cheese. The principal manufactures are sawn lumber, bricks, cement, refined clay products, pork-packing, beef-canning, and milling. Cheap coal is mined within the province. Alberta has 16,588 sq. m. of coal-lands, estimated to contain 89,330,000,000 tons, mostly lignite. All the rivers flowing from the Rocky Mountains carry gold in the gravels. Graphite and gypsum exist in the Rocky Mountains, and there is copper in quantity in the vicinity of Lake Athabasca. Natural gas is used extensively in Medicine Hat for heating, power, and lighting purposes, and is available in the north along the Athabasca River. In 1904 the railway system increased from 650 miles to 2700; and in 1917 it exceeded 4500 miles.

Free land is obtained under regulations framed by the Dominion government. Each person is eligible for 160 acres, on settlement conditions, for a registration fee of $10. Improved farms may be had at prices from $15 to $45 per acre. Railway companies have large tracts for sale. Irrigation is extensively carried on in the southern portion of the province, where the rainfall is in some years deficient. Four parks have been set aside in Alberta by the Dominion government for the preservation of the *fauna* of the country. Banff National Park and Jasper Park (5450 sq. m.) are situated in the Rocky Mountains. Buffalo Park (530 sq. m.) is set apart for the preservation of the bison, and has one of the largest herds now left in the world. Elk Island Park is set apart for the preservation of the deer family.

Albert-Edward. See EDWARD VII.

Albert-Edward Nyanza, or LAKE EDWARD, as it is now called, a lake of Equatorial Africa, discovered by Stanley in 1876. It occupies the southern end of a vast natural depression, of which the Albert Nyanza fills the northern extremity; is due south of the mountain mass of Ruwenzori; and is surrounded by wide grassy plains, over which it once seems to have extended. Its length seems to be about 50 miles, the breadth a little less, the general shape being somewhat circular; but there is a north-eastern extension (Dweru) 25 miles long, connected with the lake by a channel not above from 400 to 1000 yards wide. According to the Anglo-Congolese boundary commission of 1906–7, its height above the sea is not, as had been said, 2240 feet, but 3000 feet. South-east is the Mfumbiro mountain mass. The commission recommended that the name should be simplified (as that of King Edward VII. had been) to Lake Edward. The water of the lake flows into the Albert Nyanza by the Semliki River, 130 miles long.

Albertite. See BITUMEN.

Albert Lea, Minnesota, on a lake of the same name, about 100 miles S. of St Paul, has a pop. of 8000.

Albert Medal, a decoration which, in its original institution in 1866, was intended to reward heroic acts of mariners and others in saving life at sea. A warrant of April 12, 1867, in place of the one decoration, instituted two, called the Albert Medal of the First Class, and the Albert Medal of the Second Class. In April 1877, the Albert Medal was extended to acts of gallantry in preventing loss of life in mines, on railways, at fires, and in other perils on land. The decoration of the First Class for saving life at sea is shown in the figure, and consists of a gold oval badge enamelled in dark blue, surrounded with a Garter in bronze, with the inscription in gold raised letters. It is suspended from a dark-blue and white striped ribbon. The decoration of the First Class for saving life on land is similar, except that the enamel is red, the anchor omitted, and the word 'land' in the inscription replaces 'sea.' The ribbon is crimson and white. The badge of the Second Class differs in each case from that described by being all in bronze. A bar is attached to the ribbon as a reward for every subsequent act of bravery. At the beginning of the 20th century there were 15 First-class and over 50 Second-class holders of the medal for saving life at sea, and 13 First-class and above 60 Second-class holders of that for saving life on land.—ALBERT MEDAL is also the name of a distinction granted since 1864 by the Society of Arts. It was founded to reward distinguished merit in promoting arts, manufactures, or commerce; and has been conferred on many of the most notable men of science, engineers, and inventors in Britain, America, and France.

Albert Nyanza (Mwutan Nzige, Luta Nzige), a large lake of East Central Africa, is situated in a deep rock-basin, 80 miles NW. of the Victoria Nyanza. It is of an oblong shape, just about 100 miles long from N. to S., and 25 broad. On the E. it is fringed by precipitous cliffs, with isolated peaks rising 5000 feet above it. The lake itself lies 2400 feet above the sea, and 1400 feet below the general level of the country; its water is fresh and sweet, and it is of great depth towards the centre. The N. and W. shores of the lake are bordered by the Blue Mountains, nearly 10,000 feet in height. The existence of this vast lake first became known to Europeans through Speke and Grant in 1862; in 1864 Sir Samuel Baker was the first European to visit it, and named it after the Prince-Consort. In 1887 Emin Pasha recorded his conviction that the western part of the lake was filling up; on its shores Stanley met Emin in 1889; and Captain Lugard came hither from Uganda in 1890. The lake is a great reservoir or backwater of the Nile. The Somerset-Nile runs into its north-east corner, and the Nile issues out of its north-west corner. To the south-east of it lies the country of Unyoro. It has recently been proposed to dam this lake, so as to regulate the rising of the Nile, and improve the irrigation of Egypt.

Albert River, North Queensland, traverses a grassy plain, and falls into the Gulf of Carpentaria, below Burketown, after a total course of about 200 miles. It is connected by a cross branch with another nearly parallel stream, the Gregory. The climate of its basin is tropical, and the land is partly occupied for grazing purposes.

Albertus Magnus, COUNT OF BOLLSTÄDT, the great scholastic philosopher of the first half of the 13th century, was born at Lauingen, in Swabia, in 1193. After finishing his studies at Padua, he entered the lately-founded order of the Dominican friars, and taught in the schools of Hildesheim, Ratisbon, and Cologne, where Thomas Aquinas became his pupil. In 1245 he repaired to Paris, where for some years he publicly expounded the doctrines of Aristotle. In 1254 he became provincial of the Dominican order in Germany. In 1260 he received from Pope Alexander IV. the bishopric of Ratisbon. But in 1262 he retired to his convent at Cologne to devote himself to literary pursuits, and here he composed many of his works. He had fallen into dotage some years before his death, which occurred in 1280. The extensive chemical and mechanical knowledge which, considering the age in which he lived, Albertus Magnus possessed, brought upon him the imputation of being a sorcerer and magician. Jammy, a Dominican, published the works of Albertus in 21 folio vols. in 1651; and some of them, as also the apocryphal *De Secretis Mulierum* attributed to him, have been published separately. The most notable are the *Summa Theologiæ* and the *Summa de Creaturis*. Albertus excelled all his contemporaries in the wideness of his learning; he was not inaptly termed the *doctor universalis*. He was not so remarkable for originality; and was to the best of his ability a faithful follower of Aristotle as presented by Jewish, Arabian, and western commentators. He stood midway between Realists and Nominalists in philosophy, and did more than any predecessor to bring about that marvellous union of theology and Aristotelianism which is the basis of scholasticism. Both in physics and metaphysics he mainly repeats Aristotle. See ALCHEMY, SCHOLASTICISM, and works by Sighart (1857; trans. 1876), D'Assailly (1870), and Bach (1881).

Albi, capital of the department of Tarn in the south of France, is built on a height near the Tarn, a tributary of the Garonne, 42 miles by rail NE. of Toulouse. It is very old, and suffered greatly during the religious wars which devastated the land in the time of the Albigenses, who took their name from this place. Besides the usual government offices, it possesses a public library and a museum and theatre. The chief buildings are the cathedral (1282–1512), the old fortress, and the archbishop's palace. Pop. 27,000.

Albigenses is a name applied loosely to the 'heretics,' belonging to various sects, who abounded in the south of France about the beginning of the

13th century. They are heard of nearly two centuries earlier, and were regarded as Manichæans; the position and prominence in their system of evil have certainly a Manichæan look. Sabatier and others identify them with the Cathari (q.v.), whose doctrines were a mixture of Buddhism, Mazdeism, and Agnosticism, and so eminently heretical by the most liberal standard. Though the Catholics charged them with unnatural vices, they professed apostolical Christianity and pure or even ascetic morals. After their condemnation by Pope Calixtus II., at the council held at Toulouse in 1119, they were usually styled the 'Toulouse heretics.' The Toulouse judgment was confirmed by Innocent II. in 1139. At a council held at Lombes, near Albi, in 1176, they spoke out more openly in defence and explanation of their doctrines; but in spite of this, they were accused later of dualism, of denying the dogmas of the Trinity and the death and resurrection of Jesus, and of refusing the eucharist and marriage. It should be remembered that the only accounts of them that we possess, have come to us through the medium of embittered and unscrupulous antagonists. The name arose from the circumstance that the district of Albigeois in Languedoc—now in the department of Tarn, of which Albi is the capital—was the first point against which the crusade of Pope Innocent III. (1209) was directed. The immediate pretence of the crusade was the murder of the papal legate and inquisitor, Peter of Castelnau, who had been commissioned to extirpate heresy in the dominions of Count Raymond VI. of Toulouse; but its real object was to deprive the count of his lands, as he had become an object of hatred from his toleration of the heretics. It was in vain that he had submitted to the most humiliating penance and flagellation from the hands of the legate Milo, and had purchased the papal absolution by great sacrifices. The legates, Arnold, abbot of Cîteaux, and Milo, stormed Béziers, the capital of Raymond's nephew, Roger, and massacred 20,000—some say 40,000—of the inhabitants, Catholics as well as heretics. That Arnold cried, 'Kill them all; God will know his own!' is denied. Simon, Count of Montfort (q.v.), who conducted the war under the legates, proceeded in the same relentless way with other places in the territories of Raymond and his allies. Of these, Roger of Béziers died in prison, and Peter I. of Aragon fell in battle. The conquered lands were given as a reward to Simon of Montfort, who never came into quiet possession of the gift. At the siege of Toulouse (1218), he was killed by a stone, and Counts Raymond VI. and VII. disputed the possession of their territories with his son. But the papal indulgences drew fresh crusaders from every province of France to continue the war. Raymond VII. continued to struggle bravely against the legates and Louis VIII. of France, to whom Montfort had ceded his pretensions, and who died during the war in 1226. After thousands had perished on both sides, and the finest parts of Provence and Upper Languedoc had been devastated, a peace was concluded in 1229, at which Raymond purchased relief from the ban of the church by immense sums of money, gave up Narbonne and several lordships to Louis IX., and had to make his son-in-law, the brother of Louis, heir of his other possessions. These provinces, hitherto independent, were thus, for the first time, joined to the kingdom of France; and the pope sanctioned the acquisition, in order to bind Louis more firmly to the papal chair, and induce him more readily to admit the Inquisition. The heretics were handed over to the proselytising zeal of the order of Dominicans and the bloody tribunals of the Inquisition; and both used their utmost power to bring the recusant Albigenses to the stake, and also, by inflicting severe punishment on the penitent converts, to inspire a wholesome dread of reincurring the displeasure of the church. From the middle of the 13th century, the name Albigenses gradually disappears. The remnants of them took refuge in the east, and settled in Bosnia, but there also they soon became extinct.

Compare Faber, *Inquiry into the History and Theology of the Vallenses and Albigenses* (Lond. 1838); Hahn, *Geschichte der Ketzer im Mittelalter* (1845); Schmidt, *La Secte des Cathares ou Albigeois* (1849); Peyrat, *Histoire des Albigeois* (1882); Tocco, *'Eresia nel Medio Evo* (1884); Lea, *History of the Inquisition* (1888).

Albi'nos (Portuguese, from Lat. *albus*, 'white') —called also Leucoethiopes, or white negroes, and by the Dutch and Germans Kakerlaken—were at one time considered a distinct race; but closer observation has shown that the same phenomenon occurs in individuals of all races, and that the peculiar appearance arises from an irregularity in the skin, which has got the name of *leucopathy* or *leucosis*. It consists in the absence of the colouring matter which, in the normal state, is secreted in the deepest layer of the cuticle, and also of the dark pigment of the eye; so that the skin has a pale, sickly white colour, while the iris of the eye appears red, from its great vascularity. As the pigment in the coats of the eye serves to diminish the stimulus of the light upon the retina, albinos generally cannot bear a strong light; on the other hand, they see better in the dark than others. The colouring matter of the hair is also wanting in albinos, so that their hair is white. All these differences are of course more striking in the darker varieties of the species, and most of all in the negro albinos. Albinoism is always born with the individual, and occurs not only in men, but also in other mammalia, in birds, and probably in insects. The peculiarity may be inherited. The opinion that albinos are distinguished from other men by weakness of body and mind is completely refuted by facts. See Karl Pearson's monograph in *Man* (1913).

Albion, the ancient name of the island of Britain. See ALBANY.

Albion, a city of Michigan, U.S., 96 miles W. of Detroit, in the centre of a grain district, is the seat of a Methodist Episcopal college (1835); pop. 8400.—ALBION, in New York, 30 miles W. of Rochester, is a fruit-canning and agricultural centre, with a beautiful cemetery; pop. 5000.

Albion Metal. See ALLOY.

Alboin, the founder of the Lombard dominion in Italy, succeeded his father in 561 A.D. as king of the Lombards, who were at that time settled in Pannonia. His thirst for action first showed itself in aiding Narses against the Ostrogoths; and afterwards, in a war with the Gepidæ, whom he, in conjunction with the Avars, defeated in a great battle (566), slaying their king Kunimond with his own hand, and marrying his daughter Rosamond. Report brought back by some of his warriors, who had accompanied Narses into Italy, determined Alboin, in 568, to invade it with his own nation of Lombards, the remains of the Gepidæ, and 20,000 Saxons. He soon overran and subdued the country as far as the Tiber, fixing his principal residence at Pavia, which long continued to be the Lombard capital; but in 574 his cruelty cost him his life. During a feast at Verona, he made his queen drink out of the skull of her father, which he had turned into a wine-cup; and she, in revenge, incited her paramour to murder him. Strangely enough, Alboin was a just and beneficent ruler. He was beloved by his subjects, whom he stimulated into that fierce energy which characterised their descendants for ages. For several centuries his name continued

famous among the Teutonic nations. Rosamond fled to Longinus, the exarch, at Ravenna. Longinus becoming her suitor, she administered poison to her paramour, who, discovering the treachery, caused her to drain the cup and share his death.

Alboni, MARIETTA (1826–94), contralto singer, was born at Cesena in the Romagna, sang in London (1847) and other European capitals, but retired from the stage after marrying the Count de Pepolo. Her second husband was M. Zieger.

Albornoz, GIL ALVAREZ CARILLO, born at Cuenca in 1300, became Archbishop of Toledo, took part in the wars against the Moors, saved the life of Alfonso XI. of Castile in battle, and commanded at the siege of Algeciras, where the king dubbed him knight. On account of the Christian boldness with which he denounced the criminal excesses of Peter the Cruel, he had to flee to Pope Clement VI. at Avignon, who made him a cardinal. Innocent VII. sent him as cardinal-legate to Rome; and Pope Urban V. appointed him legate at Bologna, where he died in 1367.

Albrêt, JEANNE D'. See JEANNE D'ALBRÊT.

Albue'ra, in the Spanish province of Estremadura, an insignificant hamlet, famous for the sanguinary battle of May 16, 1811, between the combined English, Spanish, and Portuguese forces under General Beresford, and the French under Marshal Soult, who were scarcely so numerous, but had abundant artillery. Soult's object was to compel the English to raise the siege of Badajoz, but he was obliged to retreat to Seville, with the loss of 9000 men; whilst the allied forces lost about 7000.

Albufe'ra (Arabic, 'the lagoon'), a lake near Valencia, in Spain, about 12 miles in length and 4 in breadth, divided from the sea by a narrow tongue of land; canals connect it with the sea and Valencia. It is rich in fish and fowl. The revenues of the domain were granted by the Spaniards to Wellington.

Albu'go is a term employed in Surgery to designate the white opacity that often follows ulceration of the cornea of the eye. In infancy, the comparatively rapid interchange of materials will often diminish to a great extent both the extent and density of these spots; but in after-life they do not undergo similar absorption, nor are they amenable to surgical relief. The disease is also called *Leucoma.*

Al'bula, a pass and mountain stream in the Swiss canton of Grisons. The pass (elevation, 7595 feet) is a marshy plateau, three-fourths of a mile long, with granite and limestone summits towering on either side of it. The stream rises close by, and after a course of 20 miles, broken by numerous picturesque waterfalls, it joins a tributary of the Rhine.

Album (Lat., 'white'), amongst the Romans, was a white tablet overlaid with gypsum, on which were written the *Annales Maximi* of the pontifex, edicts of the prætor, and rules relative to civil matters. It was so called, either because it was composed of a white material, or because the letters used were of that colour. In the middle ages, the word was used to denote any list, catalogue, or register, whether of saints, soldiers, or civil functionaries. In the universities on the Continent, the list of the names of the members is called the album. But its popular signification in modern times is that of a book for containing photographs, or a blank book for a drawing-room table, and intended to receive fugitive pieces of verse, or the signatures of distinguished persons, or sometimes merely drawings, prints, marine plants, postage stamps, and the like. Another modern use of the word is as applied to collections of engravings of specimen pictures of distinguished artists—as a Murillo album, or a Rembrandt album.

Albumen is a term used in Physiological Chemistry and in Botany in distinct senses: (*a*) A definite proteid substance (now frequently spelt *Albumin,* so as to agree in form with the other organic compounds), containing carbon, hydrogen, oxygen, nitrogen, and a small percentage of sulphur, coagulable by heat, mineral acids, alcohol, ether, tannic acid, &c., and existing in animals in white of egg and blood serum, and in plants in seeds and elsewhere (see ANIMAL CHEMISTRY, PROTEINS). It is the sulphur of the albumen that blackens silver when brought in contact with eggs, and the smell of rotten eggs arises from the formation of sulphuretted hydrogen during their decomposition. The property of coagulating with heat at about 160° F. (71° C.) adapts albumen for the purpose of clarifying in sugar-refining and other processes. The albumen is added to the liquid in the cold state, allowed to mix thoroughly therein, and then, when heated, it coagulates, entangling and separating all the impurities suspended in the liquid. In cooking, the juiciness of a steak or roast depends largely on the proteid substances, coagulated by the sudden application of heat, preventing the evaporation of the juices of the meat during the subsequent slow heating required to fit it for the table. With many metallic salts, such as bichloride of mercury (corrosive sublimate), sulphate of copper (blue vitriol), acetate of lead (sugar of lead), and nitrate of silver (lunar caustic), it forms insoluble compounds, and is therefore used as an antidote to these poisons. A paste made by mixing albumen with slaked lime, sets, in a short time, to a mass of stony hardness, and, in virtue of this property, makes an admirable cement for broken earthenware, or other purposes. The importance of albumen as an article of diet will be discussed under FOOD.

(*b*) A botanical term, without chemical significance, applied to the store of various reserve nutritive materials laid up for the use of the embryo within the seed. The term is only applied to the nutritive tissue when it is stored apart from the embryo proper, either within the embryo-sac (*endosperm*), or round about it (*perisperm*). Seeds which have abundant nutritive reserves containing proteids, &c., may still be 'exalbuminous' when the nutritive matter is stored within the embryo itself, as in the common pea. The characters of the albumen are important in botanical diagnosis. It is sometimes very small, as in the nettle; in other instances, on the contrary, it is very much larger than the embryo, as in the coconut, of which it forms the edible part. It is sometimes *mealy* or *farinaceous,* as in the cereals; *oily,* as in the poppy; *horny,* as in coffee; *cartilaginous,* as in the coconut; *mucilaginous,* as in the mallow. Vegetable ivory is the albumen of a palm (*Phytelephas*) which grows on the banks of the Magdalena in Colombia, and is used in place of ivory. It is thus the albumen which makes many seeds valuable for edible and other purposes, though others, no less valuable, have the nutritive materials stored within the embryo. See OVULE, SEED.

Albuminuria is a name for Bright's disease of the kidneys (see BRIGHT'S DISEASE); but albumen occurs in the Urine (q.v.) of perfectly healthy persons, and varies according to circumstances—often in young adults after muscular exercise, and with some people in indigestion and after cold baths.

Albuñol, a small town of Spain, 40 miles SE. of Granada, near the Mediterranean coast; pop. 9000.

Albuquerque, a town of Spain, 24 miles N. of Badajoz, near the Portuguese frontier. It stands

on an eminence, and is defended by a strong fortress. Pop. 9000.

Albuquerque, Affonso d', 'the Great,' viceroy of the Indies, was born in 1453, near Lisbon. In that age, the Portuguese people were distinguished for heroism and a spirit of adventure. They had discovered and subjugated a great part of the western coast of Africa, and were beginning to extend their dominion over the seas and the people of India. Albuquerque being appointed viceroy of these new possessions, landed on the Malabar coast in 1503, with a fleet and some troops; conquered Goa, which he made the seat of the Portuguese government, and the centre of its Asiatic commerce; and afterwards Ceylon, the Sunda Isles, the peninsula of Malacca, and (in 1515) the island of Ormuz at the entrance of the Persian Gulf. When the king of Persia sent for the tribute which the princes of this island had formerly rendered to him, Albuquerque presented bullets and swords to the ambassador, saying: 'This is the coin in which Portugal pays her tribute.' He made the Portuguese name profoundly respected among the princes and people of the East; and many of them, especially the kings of Siam and Pegu, sought his alliance and protection. He maintained strict military discipline, was active, far-seeing, wise, humane, and equitable, respected and feared by his neighbours, while beloved by his subjects. His virtues made such an impression on the Indian peoples, that long after his death they resorted to his grave to implore his protection against the misgovernment of his successors. Yet he did not escape the envy of courtiers and the suspicions of his king, who appointed Soarez, a personal enemy of Albuquerque, to supersede him as viceroy. This news reached him just as he was leaving Ormuz, and gave a severe shock to his shattered health. A few days after, he died at sea near Goa, December 16, 1515. His *Commentaries* were translated by Birch for the Hakluyt Soc. (4 vols. 1875–84).

Alburnum, or Sap-wood, is the youngest and most external portion of the wood of ordinary dicotyledonous trees. It is still imperfectly hardened, and lies between the *Bark* (q.v.) and the *heartwood* or *Duramen* (q.v.). There is often a very marked division between it and the duramen, in trees whose age is such that the latter has been perfected. The alburnum differs from the duramen in having its tubes readily permeable by fluids (see Physiology, Vegetable). It gradually hardens, and is transformed into duramen, new layers being added externally. It is almost always of a white or very pale colour, whilst in many trees the duramen is highly coloured. The alburnum is pale even in ebony, in which the duramen is black. In general, the alburnum is much inferior in value to the hardened or perfected wood. See Timber, Wood.

Albury, sometimes called the Federal City, on the New South Wales bank of the Murray River, is 190 miles NE. of Melbourne by rail, in a fertile agricultural and pastoral district, producing wine and tobacco, with a little gold. In the wet season the Murray is navigable thus far, 1000 miles from its mouth, and is here spanned by two bridges (one for the railway). Pop. about 8000.

Alca and **Alcadæ.** See Auk.

Alcæus of Mitylene, one of the greatest lyric poets of Greece, flourished about 600 B.C. Most of his odes, in the Æolic dialect, are occupied with his grief for the dissensions of his country, his hatred of tyrants, his own misfortunes, and the sorrows of exile; in some he celebrates the praises of love and wine. He is said to have been an admirer of Sappho, who was a contemporary. Alcæus himself took part in the civil war, first as the coadjutor of Pittacus, but afterwards against him, when he proved a tyrant. Being banished from Mitylene, he endeavoured, at the head of the other exiles, to force his way back; but in this attempt he fell into the hands of Pittacus, who, however, granted him his life and freedom. He was the inventor of the Alcaic verse, which Horace, the happiest of his imitators, transplanted into the Latin language. Of the ten books of his odes, the few fragments that remain are collected in Bergk's *Poetæ Lyrici Græci* (4th ed. 1882). The new fragments discovered by Grenfell and Hunt are too fragmentary to add to our knowledge or modify our ideas of Alcæus.

Alcahest. See Alchemy.

Alcala' de Guadaira, a summer-resort of Spain, near the Guadaira, 9 miles E. by S. from Seville, is celebrated for its bread. Seville is chiefly supplied from it. Pop. 10,000.

Alcala' de Henares, a town in Spain, Cervantes's birthplace, on the Henares, 21 miles E. of Madrid by rail. It once boasted of a university, founded by the famous Cardinal Ximenes in 1510, which enjoyed a European fame, and was attended by thousands of students. It was removed to Madrid in 1836, and the town is now not a shadow of its former self. Here was printed in 1517, in six folio volumes, at an expense of 80,000 ducats, the great Complutensian Bible, a monument of the piety and learning of the great cardinal. The chief buildings are the Colegio de San Ildefonso, the seat of the ancient university; the Colegiata (restored 1908), containing the founder's monument; the archbishop's palace; the cathedral; and the church of Santa Maria, in which Cervantes was baptised, October 9, 1547. The house in which he was born is marked by an inscription. Pop. 10,000. The *Complutum* of the Romans, the town owes its modern name to the Moors, under whom it was *Al-Kalat*, 'the castle.'

Alcala' la Re'al ('the royal castle'), a city of Andalusia, Spain, in the province of Jaen, and 26 miles NW. of Granada. It is situated on a high plateau, and is a very picturesque town, irregularly built, with steep and narrow streets and bold towers. It was a strong fortress under the Moors, but was taken in 1340 by Alfonso XI. in person, whence it obtained the name *Real*. The neighbourhood produces grain and fruits of the finest quality, and there is some trade in wine and wool. Pop. 20,000.

Alcal'de, a corruption of the Arabic *al-qadi*, 'the judge.' It is still used in Spain as the general title for the elected president of the council of the commune, who exercises both judicial and magisterial offices. See Cadi.

Al'camo, a quaint old town of Sicily, 52 miles SW. of Palermo by rail. Originally founded by the Saracens, it stood on the neighbouring Monte Bonifato (2713 feet), and long retained a Moslem population, who were driven out by the Emperor Frederick II. in 1233, when the new town was built at the foot of the hill. Pop. 50,000.

Alcañiz', a town of Aragon, Spain, in the province of Teruel, 63 miles SE. from Saragossa, on the Guadalope. It has a magnificent collegiate church. Pop. 8000.

Alcan'tara (Arabic, 'the bridge'), an old Spanish town in Estremadura, on a rocky height above the Tagus, near the Portuguese frontier. The bridge from which it takes its name was built under Trajan, 105 A.D. It consists of six arches; the whole length is 670, and the height 210 feet. It has twice been partially blown up in time of war, but the larger part is still intact. Pop. 3500.

THE ORDER OF ALCANTARA, one of the religious orders of Spanish knighthood, was founded in 1156 as a military fraternity for the defence of Estremadura against the Moors. In 1177, Pope Alexander III. raised it to the rank of a religious order of knighthood; and the grand-mastership of the order was by Pope Alexander VI. united to the Spanish crown in 1494. The order came to be richly endowed. The knights, who follow the rule of St Benedict, take the usual vows of obedience and poverty, a special vow also binding them to defend the immaculate conception of the Virgin. In the nineteenth century the order was several times suppressed, and as often restored. Thus it was suppressed in 1872, and restored again in 1874.

Alcan'tara, a seaport town of Brazil, in the province of Maranhão, on the Bay of St Marcos. Pop. 20,000.

Alcaraz, a town of La Mancha, Spain, 36 miles WSW. of Albacete. A ruined castle crowns the summit of the hill; and there are also the remains of a fine Roman aqueduct. Pop. 5000.

Alcaude'te (ancient *Uditunum*), a town of Spain, 22 miles SW. of Jaen. Pop. of commune, 10,000.

Alcazar de San Juan (ancient *Alce*), a town of Spain, in the province of Ciudad Real, 92 miles SSE. of Madrid by rail. Pop. 12,000.

Alcazar-kebir, a city of Morocco, about 80 miles NW. of Fez, with considerable trade. In a battle here in 1578, Sebastian, king of Portugal, was defeated and slain by the Moors. Pop. nearly 9000, many Jews.

Alce'do. See KINGFISHER.

Alcestis, the wife of Admetus, king of Pheræ in Thessaly. The god Apollo tended her husband's flocks when exiled from heaven for having slain the Cyclopes, and out of gratitude for his kindly treatment, prevailed upon the Fates to grant Admetus deliverance from death, if his father, mother, or wife should die in his stead. When the fatal hour arrived, Alcestis alone was found ready to give up her life for his. She was brought back to her husband from the lower world by Hercules. Alcestis is the subject of a noble tragedy by Euripides, which Browning has translated, and she appears as Chaucer's highest ideal of womanhood in the Prologue to his *Legende of Goode Women*. The allusion to her story in one of the finest of Milton's sonnets will be remembered.

Alchemilla. See LADY'S MANTLE.

Alchemy is to modern chemistry what astrology is to astronomy, or legend to history. In the eye of the astrologer, a knowledge of the stars was valuable only as a means of foretelling, or even of influencing, future events. In like manner, the genuine alchemist toiled with his crucibles and alembics, calcining, subliming, distilling, not with a view to discover the chemical properties of substances, as we understand them, but with two grand objects, as illusory as those of the astrologer —to discover, namely, (1) the secret of transmuting the baser metals into gold and silver, and (2) the means of indefinitely prolonging human life.

The word is derived from the Arabic *alkīmīa*, compounded of the Arabic article and a Greek word *chēmia*, used in Diocletian's decree against Egyptian works treating of the *chēmia* (transmutation) of gold and silver. The Greek word is now most usually explained to mean 'the Egyptian art,' and derived from the Egyptian name for Egypt, *Khmi;* but it was ultimately confounded with the true Greek *chumeia*, pouring, infusion. The latter form, which was possibly, however, the real original of *chēmia*, justifies the Renaissance spellings, *alchymy* and *chymistry*.

Tradition points to Egypt as the birthplace of the science. Hermes Trismegistus is represented as the father of it; but it should be remembered that the speculations of some of the early Greek philosophers, as of Empedocles, who first named the four elements, pointed in the direction of a rudimentary chemical theory. Zosimus the Theban discovered in sulphuric acid a solvent of the metals, and liberated oxygen from the red oxide of mercury. The students of the 'sacred art' at Alexandria believed in the transmutation of the four elements. The Roman emperor Caligula is said to have instituted experiments for producing gold out of orpiment (sulphuret of arsenic); and in the time of Diocletian, the passion for this pursuit, conjoined with magical arts, had become so prevalent in the empire, that that emperor is said to have ordered all Egyptian works treating of the chemistry of gold and silver to be burnt. For at that time multitudes of books on this art were appearing, written by Alexandrine monks and by hermits, but bearing famous names of antiquity, such as Democritus, Pythagoras, and Hermes.

At a later period, the Arabs, who had enthusiastically adopted Aristotle from the Greeks, appropriated the astrology and alchemy of the Persians and the Jews of Mesopotamia and Arabia; and it is to them that European alchemy is directly traceable. The school of polypharmacy, as it has been called, flourished in Arabia during the califates of the Abbasides. The earliest work of this school now known is the *Summa Perfectionis*, or 'Summit of Perfection,' composed by Gebir (q.v.) in the 8th century; it is consequently the oldest book on chemistry proper in the world. It contains so much of what sounds very much like jargon in our ears, that Dr Johnson (erroneously) ascribed the origin of the word 'gibberish' to the name of the compiler. Yet when viewed in its true light, it is a wonderful performance. It is a kind of text-book, or collection of all that was then known and believed. It appears that these Arabian polypharmacists had long been engaged in calcining and boiling, dissolving and precipitating, subliming and coagulating chemical substances. They worked with gold and mercury, arsenic and sulphur, salts and acids; and had, in short, become familiar with a large range of what are now called chemicals. Gebir discovered corrosive sublimate, the process of cupellation of gold and silver, and distillation. He taught that there are three elemental chemicals — mercury, sulphur, and arsenic. These substances, especially the first two, seem to have fascinated the thoughts of the alchemists by their potent and penetrating qualities. They saw mercury dissolve gold, the most incorruptible of matters, as water dissolves sugar; and a stick of sulphur presented to hot iron penetrates it like a spirit, and makes it run down in a shower of solid drops, a new and remarkable substance, possessed of properties belonging neither to iron nor to sulphur. The Arabians held that the metals are compound bodies, made up of mercury and sulphur in different proportions. With these very excusable errors in theory, they were genuine practical chemists. They toiled away at the art of making 'many medicines' (polypharmacy) out of the various mixtures and reactions of such chemicals as they knew. They had their pestles and mortars, their crucibles and furnaces, their alembics and aludels, their vessels for infusion, for decoction, for cohabitation, sublimation, fixation, lixiviation, filtration, coagulation, &c. Their scientific creed was transmutation, and their methods were mostly blind gropings; and yet, in this way, they found out many a new body, and invented many a useful process. To the Arab alchemists we owe the terms alcohol, alkali, borax, elixir.

From the Arabs, alchemy found its way through

Spain into Europe generally, and speedily became entangled with the fantastic subtleties of the scholastic philosophy. In the middle ages it was chiefly the monks that occupied themselves with alchemy. Pope John XXII. took great delight in it, but denounced the searchers for gold 'who promise more than they can perform,' and the art was afterwards forbidden by his successor. The earliest authentic works on European alchemy now extant are those of Roger Bacon (1214–94) and Albertus Magnus (1193–1280). Roger Bacon (q.v.), who was acquainted with gunpowder, condemns magic, necromancy, charms, and all such things, but believes in the convertibility of the inferior metals into gold. Still, he does not profess to have ever effected the conversion, an idea which took firm possession of the imagination and, latterly, of the avarice of the middle ages. Their conception was that gold was the perfect metal, and that all other metals were so many removes or deflections from gold, in consequence of arrestment, corruption, or other accidents. Now, though gold, being simply perfect, could not, if mixed with the imperfect, perfect the latter, but would rather share its imperfections; yet, were a substance found many times more perfect than gold, it might well perfect the imperfect. Such a substance would be composed of purest mercury and sulphur, commingled into a solid mass, and matured by wisdom and artificial fire into possibly a thousand thousand times the perfection of the simple body. This was the philosopher's stone which so many devotees of alchemy in the middle ages toiled in vain to fabricate. Roger Bacon followed Gebir in regarding potable gold—that is, gold dissolved in nitro-hydrochloric acid or *aqua regia*—as the elixir of life. Urging it on the attention of Pope Nicholas IV., he informs his Holiness of an old man who found some yellow liquor (the solution of gold is yellow) in a golden phial, when ploughing one day in Sicily. Supposing it to be dew, he drank it off. He was thereupon transformed into a hale, robust, and highly accomplished youth. — Albertus Magnus (q.v.) had a great mastery of the practical chemistry of his times; he was acquainted with alum, caustic alkali, and the purification of the royal metals by means of lead. In addition to the sulphur-and-mercury theory of the metals, drawn from Gebir, he regarded the element water as still nearer the soul of nature than either of these bodies. He is the first to speak of the affinity of bodies, a term he uses in reference to the action of sulphur on metals.—Thomas Aquinas (q.v.) also wrote on alchemy, and was the first to employ the word *Amalgam* (q.v.).—Raymond Lully (q.v.) is another great name in the annals of alchemy. He was the first to introduce the use of chemical symbols, his system consisting of a scheme of arbitrary hieroglyphics. He made much of the spirit of wine (the art of distilling spirits would seem to have been then recent), imposing on it the name of *aqua vitæ ardens*. In his enthusiasm, he pronounced it the very elixir of life.—Basil Valentine (q.v.) used to get the credit of having, about the end of the 15th century, introduced antimony into medical use. He, it was said, regarded salt, sulphur, and mercury as the three bodies contained in the metals; and he inferred that the philosopher's stone must be a compound of salt, sulphur, and mercury, so pure that its projection on the baser metals should be able to work them up into greater and greater purity, bringing them at last to the state of silver and gold. But as it has been proved that 'Basil Valentine' is but an assumed name for Johann Thölde, writing in the middle of the 17th century, the attribution of these views to a writer of the 15th century has brought confusion into this part of the history.

But more famous than all was Paracelsus (q.v.), in whom alchemy proper may be said to have culminated. He held, with Basil Valentine, that the elements of compound bodies were salt, sulphur, and mercury—representing respectively earth, air, and water, fire being already regarded as an imponderable—but these substances were in his system purely representative. All kinds of matter were reducible under one or other of these typical forms; everything was either a salt, a sulphur, or a mercury, or, like the metals, it was a 'mixt' or compound. There was one element, however, common to the four; a fifth essence or 'quintessence' of creation; an unknown and only true element, of which the four generic principles were nothing but derivative forms or embodiments: in other words, he inculcated the dogma, that there is only one real elementary matter — nobody knows what. This one prime element of things he appears to have considered to be the universal solvent of which the alchemists were in quest, and to express which he introduced the term *alcahest*. He seems to have had the notion, that if this quintessence or fifth element could be got at, it would prove to be at once the philosopher's stone, the universal medicine, and the irresistible solvent. An often-quoted saying of his is '*Vita ignis, corpus lignum*' (Life is the fire, the body the fuel).

After Paracelsus, the alchemists of Europe became divided into two classes. The one class was composed of men of diligence and sense, who devoted themselves to the discovery of new compounds and reactions—practical workers and observers of facts, and the legitimate ancestors of the positive chemists of the era of Lavoisier. The other class took up the visionary, fantastical side of the older alchemy, and carried it to a degree of extravagance before unknown. Instead of useful work, they compiled mystical trash into books, and fathered them on Hermes, Aristotle, Albertus Magnus, Paracelsus, and other really great men. Their language is a farrago of mystical metaphors, full of 'red bridegrooms' and 'lily brides,' 'green dragons,' 'ruby lions,' 'royal baths,' 'waters of life.' The seven metals correspond with the seven planets, the seven cosmical angels, and the seven openings of the head—the eyes, the ears, the nostrils, and the mouth. Silver was Diana, gold was Apollo, iron was Mars, tin was Jupiter, lead was Saturn, and so forth. They talk for ever of the powder of attraction, which drew all men and women after the possessor; of the alkahest or universal solvent, and the grand elixir, which was to confer immortal youth upon the student who should approve himself fit to kiss and quaff the golden draught. There was the great mystery, the mother of the elements, the grandmother of the stars. There was the *philosopher's stone*, and there was the *philosophical stone*. The philosophical stone was younger than the elements, yet at her virgin touch the grossest calx (ore) among them all would blush before her into perfect gold. The philosopher's stone, on the other hand, was the first-born of nature, and older than the king of metals. Those who had attained full insight into the arcana of the science were styled Wise; those who were only striving after the light were Philosophers; while the ordinary practisers of the art were called Adepts. It was these visionaries that formed themselves into Rosicrucian Societies and other secret associations. It was also in connection with this mock-alchemy, mixed up with astrology and magic, that quackery and imposture so abounded, as is depicted by Scott in the character of Dousterswivel in the *Antiquary*. Designing knaves would, for instance, make up large nails, half of iron and half of gold, and lacker them, so that they appeared common nails; and when their credulous and avaricious dupes saw them extract

from what seemed plain iron an ingot of gold, they were ready to advance any sum that the knaves pretended to be necessary for pursuing the process on a large scale. It is from this degenerate and effete school that the prevailing notion of alchemy is derived—a notion which is unjust to the really meritorious alchemists who paved the way for genuine chemistry. In 1782 Dr Price of Guildford exhibited to George III. some specimens of gold he affirmed he had made from a red and white powder. Being called upon, as a member of the Royal Society, to repeat his experiments in the presence of two witnesses, after much equivocation he took poison and died (1783). Robert Boyle believed in the possibility of the alchemistic transmutations; Sir Isaac Newton in his earlier years searched for the philosopher's stone; Goethe was sympathetic. And the leading tenet in the alchemists' creed — the transmutability of other metals into gold and silver, a doctrine it was thought modern chemistry had utterly exploded—receives not a little countenance from some of the facts in connection with Allotropy (q.v.), but especially from the proof that the emanation from Radium (q.v.) is transformed into helium. Probably radium itself arises by a similar transformation from uranium; perhaps lead is what remains of the radium emanation when the helium is removed; and cognate speculations point to the production of gold from baser metals as a not quite impossible (if unprofitable) achievement.

See Kopp's *Die Alchemie in älterer und neuerer Zeit* (2 vols. 1886); Berthelot, *Les Origines de l'Alchimie* (1885); Hoefer's *Histoire de la Chimie* (1869); Rodwell's *Birth of Chemistry* (1874); H. Stanley Redgrove, *Alchemy Ancient and Modern* (1922); and Ray Lankester's presidential address to the British Association, 1906.

Alcibi'ades, born at Athens about 450 B.C., lost his father, Clinias, at Coronea (447), and was brought up in the house of his kinsman Pericles. His goodly person, his accomplishments, and the high position of Pericles procured him a multitude of friends and admirers. Socrates gained influence over him, but was unable to restrain his love of luxury and dissipation, stimulated by the wealth his marriage with Hipparete brought him. His public displays, especially at the Olympic games, were costly beyond belief. He first bore arms in the expedition against Potidæa (432 B.C.), where his life was saved by Socrates—a debt which eight years later he repaid at Delium, by saving, in his turn, the life of the philosopher. He seems to have taken no part in political matters till after the death of the demagogue Cleon, when Nicias brought about a fifty years' treaty of peace between Athens and Lacedæmon. Alcibiades, joining the radical party, was made commander-in-chief instead of Nicias in 420, persuaded the Athenians to alliance with Argos, Elis, and Mantinea, and stirred up afresh their ancient enmity to Sparta, with the result that they were defeated by the Spartans at Mantinea in 418. It was at his suggestion that, in 415, they engaged in the Sicilian expedition, in the command of which he and Nicias were associated. But during the preparations, one night all the statues of Hermes in Athens were mutilated. Alcibiades' enemies blamed him for this sacrilege, but postponed the impeachment till he had set sail, when they stirred up the people against him to such a degree, that he was recalled, in order to stand his trial. On the voyage home, he landed in Italy, and thence crossed to Lacedæmon, where, by conforming to the strict Spartan manners, he soon became a favourite. He induced the Lacedæmonians to send assistance to Syracuse, to form an alliance with Persia, and to support the people of Chios in their effort to throw off the Athenian yoke. He went thither himself, and raised all Ionia in revolt. But Agis and other leading Spartans, jealous of Alcibiades' success, ordered their generals in Asia to have him assassinated. Discovering the plot, he fled to Tissaphernes, a Persian satrap, who had orders to act in concert with the Spartans. He now resumed his old manners, adopted the luxurious habits of Asia, and made himself indispensable to Tissaphernes, representing to him that it was contrary to Persia's interests entirely to disable the Athenians. He then sent word to the Athenian commanders at Samos that he would procure for them the friendship of the satrap if they would establish an oligarchy at Athens. The offer was accepted, and the supreme power vested in a council of Four Hundred. When it appeared, however, that this council had no intention of recalling Alcibiades, the army at Samos chose him for a general, desiring him to lead them to Athens. But Alcibiades did not wish to return to his native country till he had rendered it some service; and during the next four years he defeated the Lacedæmonians at Cynossema, Abydos, and Cyzicus; recovered Chalcedon and Byzantium, and restored to the Athenians the dominion of the sea. He then returned home (407), on a formal invitation, and was received with general enthusiasm. His triumph, however, was brief. He was sent back to Asia with a hundred ships; but his own ill-success against Andros, and the defeat of his lieutenant at Notium, enabled his enemies to get him superseded (406). He went into exile in the Thracian Chersonesus, and two years later crossed over to Phrygia, with the intention of repairing to the court of Artaxerxes. Historians differ as to why, and by whom the deed was done; but one night, in 404, his house was fired by a band of armed men; and, rushing out sword in hand, he fell pierced with a shower of arrows. Nature had gifted him with winning eloquence (though he stuttered in his speech, and could not articulate the letter *r*), and his in a rare degree was the power to fascinate and govern men. In all his actions, he allowed himself to be guided by circumstances, because he had no fixed principles of conduct. But he possessed the boldness that arises from conscious superiority and shrinks from no difficulty.

Alciphron, a Greek author of 118 epistles professing to be written by fishermen, countrymen, courtesans, parasites—brilliant character sketches in a pure style, some of them based on Menander's plays. He lived about 180 A.D.

Alci'ra, a town of Spain, in the province of Valencia, 20 miles SSW. of Valencia, with trade in silk, rice, and oranges. Pop. 20,000.

Alclyde. See STRATHCLYDE.

Alcmæ'on, a son of Amphiaraus and Eriphyle, was one of the heroes who took part in the successful expedition of the *Epigoni* against Thebes. He was charged by his father to put his mother to death, in revenge for her having urged her husband to take part in an expedition in which his foresight showed him he should perish. She had been gained over to urge this fatal course by a gift from Polynices of the fatal necklace of Harmonia. The matricide brought upon Alcmæon madness and the horror of being haunted by the Furies, but at Psophis he was purified by Phegeus, whose daughter he married, giving her the fatal present. But the land became barren in consequence of his presence, and he fled to the mouth of the river Achelous, the god of which gave him his daughter Callirrhoë in marriage. His new wife longed for the fatal necklace, and sent her husband to Psophis to procure it, under pretence of dedicating it at Delphi; but Phegeus, learning for whom it was really intended, caused his sons to murder the ill-fated Alcmæon.

Alcman, one of the earliest Greek lyric poets, was born about the middle of the 7th century B.C. at Sardis, in Lydia, but lived, first as a slave, and afterwards as a freedman, in Sparta. The first to write erotic poetry, he composed in the Doric dialect *Parthenia*, or songs sung by choruses of virgins, bridal-hymns, and verses in praise of love and wine. Of his scanty fragments, which are given in Bergk's *Poetæ Lyrici Græci* (4th ed. 1878), the most important is a *Parthenion*, discovered on an Egyptian papyrus at Paris in 1855.

Alcock, Sir Rutherford, K.C.B., was born in 1809 in London, studied medicine there at King's College, and saw three years' service on the medical staff of the British auxiliaries in Portugal and Spain (1833–6). Sent out in 1844 as a British consul to China, he was in 1858 made consul-general in Japan, and next year received the rank of minister-plenipotentiary. This dangerous post he filled until 1865, from which year till 1871 he was envoy to the Chinese government. Made C.B. in 1860, K.C.B. in 1862, D.C.L. in 1863, and P.R.G.S. in 1876, he died 2d November 1897. Among his works are *Medical Notes on the British Legion of Spain* (1838), *The Capital of the Tycoon* (1863), and *Art in Japan* (1878). See Michie, *The Englishman in China* (1900).

Al'cohol (Arab. *al-koh'l*, originally designating a collyrium, a very fine powder of antimony for staining the eyelids; afterwards 'essence,' 'spirits'). Ordinary or *ethyl* alcohol is a limpid, colourless liquid, of a hot pungent taste, and having a slight but agreeable smell. It is the characteristic ingredient of fermented drinks, gives them their intoxicating quality, and is obtained from them by distillation. If we look at the extraordinary consumption of these liquors for various purposes, it is seen to be one of the most important substances produced by art.

Alcohol occurs in nature in several growing plants, and must therefore be regarded as an occasional constituent of plant-juices which have not undergone fermentation. It has been found in the fruit and pedicels of *Heracleum giganteum*, the fruit of the parsnip, and the unripe fruit of *Anthriscus cerefolium*. For practical purposes, there is, however, only one source of alcohol—namely, the fermentation of sugar or other saccharine matter. Some plants contain free sugar, and still more contain starch, which can be converted into sugar. The best vegetable substances, then, for yielding alcohol are those that contain the greatest abundance of sugar or of starch. Recently alcohol has been produced from sawdust. See Diastase, Fermentation, and Distillation.

Owing to the attraction of alcohol for water, it is impossible to procure pure alcohol by distillation alone. Common spirits, such as brandy, whisky, &c. contain 50 or 52 per cent. of alcohol; in other words, they are about half alcohol, half water. *Proof-spirit*, which is the standard by means of which all mixtures of alcohol and water are judged, contains 57·27 per cent. by volume, and 49·50 per cent. by weight of alcohol. The specific gravity of proof-spirit is ·9186; and when a spirit is called *above proof*, it denotes that it contains an excess of alcohol; thus, *spirit of wine*, or rectified spirit, with specific gravity ·838, is 54 to 58 overproof, and requires 54 to 58 per cent. of water to be added to it to bring the strength down to that of proof-spirit; whilst the term *under-proof* has reference to a less strong spirit than the standard (see Hydrometer). The most primitive method of learning the strength of alcohol was to drench gunpowder with it, set fire to the spirit, and if it inflamed the gunpowder as it died out, then the alcohol stood the test or proof, and was called proof-spirit. The highest concentration possible by distillation gives 90 per cent. of alcohol, still leaving 10 per cent. of water In order to remove this, fused chloride of calcium, quicklime, or fused carbonate of potash, is added to the alcoholic liquid, the whole allowed to stand for twelve hours, and then the spirit may be distilled off practically free from water. Spirit of wine may also be deprived of its remaining water by suspending it in a bladder in a warm place; the bladder allows much of the water to pass through and evaporate, but little of the alcohol. The latter method is called Soemmering's process, and depends on the different degrees of rapidity with which the bladder admits of water and alcohol passing through it. Thus, introduce into one bladder eight ounces of water, and into a second eight ounces of alcohol, and allow both bladders to be similarly exposed on a sandbath till all the water has evaporated through the pores of the membrane, which will be accomplished in about four days; and it will then be observed that whilst eight ounces of water have made their exit from the bladder, only one ounce of alcohol has thus evaporated, and seven ounces still remain in the bladder. This experiment explains why smugglers, a few generations ago, could supply a whisky which was stronger, and hence esteemed preferable, as they carried the whisky in bladders around their persons, and the water escaping therefrom in much greater proportion than the alcohol, a stronger spirit was left.

Absolute or anhydrous alcohol has a specific gravity of ·793 at the temperature of 60° F. (15·5° C.). It boils at 173° F. (78·4° C.). At a very low temperature alcohol becomes of an oily or greasy consistence, at a still lower temperature it assumes the appearance of melted wax, and at a temperature of −203° F. (−131° C.) it becomes solid. Such low temperatures are obtainable by the application of liquid air.

This property of non-freezing at any degree of cold to which the earth is subjected has led to the employment of alcohol coloured red by cochineal, in the thermometers sent out to the arctic regions. It is highly inflammable, its combustion yielding only carbonic acid and water. It has a very strong attraction for water, and when mixed with it, much heat is evolved and a contraction in volume takes place. Thus 2 gallons of alcohol and 1 of water measure less than 3 gallons. Its poisonous action when taken internally in large quantity has been referred to this same property, the idea being that it removes water from the tissues, and thus destroys them. The formula of alcohol is C_2H_5OH. In 100 pounds, therefore, of alcohol, about 53 are carbon, 13 hydrogen, and 34 oxygen. Besides the alcohol consumed in wine, beer, and spirits, it is much employed in pharmacy and in the arts. It is a powerful solvent for resins and oils; and hence is employed in the preparation of varnishes. In Germany, a cheap spirit made from potatoes is much used for cooking on a small scale.

During recent years, our knowledge of the properties of ordinary alcohol, and of the general class of bodies to which the term Alcohols is applied, in consequence of their resemblance, in certain chemical reactions, to ordinary alcohol, has been very much enlarged. The alcohols are all compounds of carbon, hydrogen, and oxygen, and are perfectly neutral to test-papers. Many of them are produced along with ordinary alcohol in the process of fermentation, and alter the flavour of the resulting beverage; such are amylic (fusel oil) and butylic alcohol. They are chiefly characterised by yielding, on treatment with acids, neutral bodies called ethers, the formation of water being a part of the

reaction. According to the theory of Types (see the article CHEMISTRY), the alcohols are divided into monatomic (comprising the important series of methyl, ethyl, propyl, and other alcohols, which are referred to further below) and polyatomic. According to their behaviour on oxidation, they are further divided into primary, secondary, and tertiary.

In a nearly anhydrous state, alcohol has little tendency to oxidation, but when freely diluted, and exposed to the air, it rapidly becomes oxidised into acetic acid. This conversion is, however, not a direct one, an intermediate compound, termed Aldehyde (q.v.), being first formed, which is rapidly oxidised into acetic acid. The oxidation of alcohol into aldehyde is represented by the equation,

Alcohol. Aldehyde. Water.

$$CH_3CH_2OH + O = CH_3COH + H_2O;$$

and the further oxidation of aldehyde into acetic acid is represented by

Aldehyde. Acetic Acid.

$$CH_3COH + O = HC_2H_3O_2.$$

In the first reaction, alcohol loses two atoms of hydrogen, water being formed; in the second, aldehyde takes up one atom of oxygen.

Every alcohol which like ordinary alcohol yields on oxidation an aldehyde, and on further oxidation an acid having the same number of carbon atoms as the alcohol itself, is termed a primary alcohol. To take another example, primary propyl alcohol, C_3H_7OH, is oxidised first into propyl aldehyde, C_3H_5OH, and then into propionic acid, $HC_3H_5O_2$. Primary alcohols are subdivided into normal and iso-alcohols, but it would lead us too far to explain the meaning of this distinction.

Secondary alcohols on oxidation lose two atoms of hydrogen, and are converted into bodies known as acetones or ketones, which differ from aldehydes inasmuch as they are not converted on oxidation into acids having the same number of carbon atoms, but are split up into acids having a smaller number of carbon atoms. Thus secondary propyl alcohol is oxidised into acetone, and on further oxidation, acetone splits up into formic and acetic acids,

Secondary Propyl Alcohol. Acetone. Water.

$$(CH_3)_2CH{\cdot}OH + O = (CH_3)_2CO + H_2O;$$

Acetone. Formic Acid. Acetic Acid.

$$(CH_3)_2CO + O = HCHO_2 + HC_2H_3O_2.$$

It will be observed that propyl alcohol and secondary propyl alcohol, propyl aldehyde and acetone, are respectively isomeric (see ISOMERISM).

Tertiary alcohols on oxidation give no aldehydes, but split up into ketones and acids having a smaller number of carbon atoms. Thus tertiary butyl alcohol, $(CH_3)_3COH$, which is isomeric, with primary and with secondary butyl alcohol, yields acetone and then acetic and formic acids. Only a comparatively small number of secondary and tertiary alcohols are at present known, and their properties and reactions have not been so thoroughly studied as those of the much more numerous class of primary alcohols. Theoretical considerations, however, lead to the belief that their number will be largely increased.

Ordinary or ethyl alcohol is monatomic—i.e. it may be regarded as being derived from the type HOH, by the substitution of its radical ethyl, C_2H_5, for one atom of hydrogen. This view is expressed by the formula C_2H_5OH.

The *monatomic alcohols* are more abundant than all the polyatomic alcohols put together. There are several series of them, of which the most important are alcohols whose radical is of the formula $C_n + H_{2n+1}$ (as methyl, CH_3; ethyl, C_2H_5; propyl, C_3H_7, &c.), and which are represented by the formula $(C_nH_{2n+1})HO$. They are intimately related to the fatty acids, whose general formula is $C_nH_{2n}O_2$, and which may be formed from the alcohols by oxidation, H_2 being replaced by O. The three highest alcohols of this set, cetylic, cerylic, and melissylic alcohols, have the formulæ $C_{16}H_{33}HO$, $C_{27}H_{55}HO$, and $C_{30}H_{61}HO$, and are solid, waxy, or fatty matters.

Of the *polyatomic alcohols*, *diatomic* alcohols belong to the secondary water type, $(H_2O)_2$ or $H_2O_2H_2$. Thus the most important diatomic alcohol, glycol, $C_2H_6O_2$, is represented, according to the theory of types, by the formula $(C_2H_4)''O_2H_2$, its radical, C_2H_4, being marked with two dashes to indicate that it replaces two atoms of hydrogen. So also there are *tri*, *tetra*, and *hexatomic* alcohols corresponding to 3, 4, and 6 molecules of water, examples of which are glycerine, $(C_3H_5)'''O_3H_3$; erythritol (obtained from litmus), $(C_4H_6)''''O_4H_4$; and mannitol (from manna), $(C_6H_8)''''''O_6H_6$.

Dry chlorine and absolute alcohol react on each other in a singular manner—the final product being a solid compound of alcohol with a very remarkable colourless oily fluid, called chloral, having a peculiar penetrating and irritating odour, and having the formula C_2Cl_3OH. By treatment with strong sulphuric acid, this chloral is set free, and may be changed into chloroform by warming with an alkali. Dilute alcohol, distilled with chloride of lime (bleaching-powder), yields chloroform; and this is the most economical process for obtaining this invaluable compound. Heated with an excess of sulphuric acid, alcohol loses all its oxygen in the form of water, and is converted into ethylene, the result being shown by the equation,

Alcohol. Ethylene. Water.

$$C_2H_6O = C_2H_4 + H_2O.$$

A less complete dehydration, under the action of sulphuric acid, converts alcohol into ether. The process is a complicated one, but the final result is expressed by the equation,

Alcohol. Ether. Water.

$$2C_2H_6O = (C_2H_5)_2O + H_2O.$$

The best tests for discovering the presence of alcohol are—(1) Its hot pungent taste, its odour, and its great volatility. (2) Absorbed in asbestos, it burns with a pale blue flame, which deposits no carbon on white porcelain; and when burned in the mouth of an inverted test-tube, containing a few drops of solution of baryta, it produces a well-marked deposit of carbonate of baryta—carbonic acid and water being the products of its combustion. (3) When boiled with sulphuric acid, and a few drops of a saturated solution of bichromate of potash, it reduces this salt to green sulphate of chromium. The chromium test, originally discovered by Dr Thomson in 1846, is that on which the French physiologists Lallemand, Perrin, and Duroy relied in their investigations regarding the presence of alcohol in the blood, urine, expired air, &c. (4) The least trace of alcohol in an aqueous solution can be detected by adding a little chloride of benzoyl, and then a little caustic potash; benzoate of ethyl, a liquid having a very characteristic aromatic odour, is at once formed, and enables one thousandth part of alcohol in a teaspoonful of water to be detected.

Alcohol is of a double use to the chemist, inasmuch as it furnishes a cleanly and valuable fuel when used in the spirit-lamp, and possesses remarkable solvent powers without in general exerting chemical action on the dissolved substances. It dissolves many of the gases more freely than water, as, for example, nitrous oxide, carbonic acid, phosphuretted hydrogen, cyanogen, and the hydro-carbons, as, for instance, ethylene. Amongst the

mineral substances which it dissolves may be mentioned iodine, bromine, boracic acid, the hydrates of potash and soda, the chlorides of calcium, strontium, magnesium, zinc, platinum, and gold, the perchloride of iron, corrosive sublimate, the nitrates of lime, magnesia, &c.; whilst amongst organic matters, it dissolves many organic acids, bases, and neutral bodies, the resins, the soaps, and the fats. The latter dissolve more freely in ether than in alcohol. The alcoholic solutions of substances used in medicine are called *Essences*, *spirits*, and *tinctures*. See BRANDY, WHISKY, FUSEL OIL, AMYL.

ACTIONS AND USES OF ALCOHOL.—Alcohol, or, more correctly, ethyl alcohol (C_2H_6O), is extensively used as a beverage by man in many different nations. In Europe it is generally consumed as (*a*) beer, formed by alcoholic fermentation of barley; (*b*) whisky, produced by fermentation of various grains; and (*c*) brandy and wines, produced by fermentation of grape-juice. The effects produced by these are due to the alcohol they contain.

The action of alcohol may be considered (1) while it is still in the stomach; (2) after it is absorbed from the stomach. Alcohol in moderate doses, when taken with meals, has practically no action upon digestion or the absorption of food, but when taken apart from food, and especially when not markedly diluted, it produces a dilatation of the blood-vessels of the stomach, and may set up a chronic congestion. This was first observed by Dr Beaumont in the case of a backwoodsman, St Martin, who, as a result of a gunshot wound, had a hole into his stomach, through which it was possible to study the lining membrane. Alcohol is absorbed without undergoing any change. The absorption is at first very rapid, but later becomes slower, apparently as a result of the alcohol exercising a poisoning action on the lining membrane of the stomach. When absorbed it is rapidly oxidised, and liberates energy in the same way as do sugars and fats. Its energy value is intermediate between those of sugar and fats, being 7 calories per gram; i.e. the oxidation of 1 gram of alcohol in the body, just as its burning outside the body, yields enough energy, as heat, to raise the temperature of 1 kilogram of water through 7° C. But while sugars and fats are oxidised to an almost unlimited extent, and when not immediately oxidised are largely stored in the body, alcohol can be combusted only to a limited extent, and even in moderate doses it may be present in the blood many hours after it has been administered. It cannot be stored for future use as fats, sugars, and starches are stored. Most people can fully oxidise about 2 oz. in the twenty-four hours. But the power of doing so varies in different people and in the same person at different times. Hence its value as a source of energy is limited. All alcohol in the body before it is oxidised, and if it escapes oxidation, acts as a drug. It stimulates and quickens the heart. It dilates the blood-vessels, especially those of the skin, and thus, in spite of the increased action of the heart, the pressure of blood in the arteries is not raised. By dilating the vessels of the skin it allows more of the warm blood from the central parts of the body to come to the surface, and so produces a sensation of warmth. But the blood is thus rapidly cooled and the temperature of the body falls, and, in exposure to cold, alcohol is prejudicial. On the nervous system it acts as a poison in the same way as do ether and chloroform, and like these drugs it first affects the higher centres of the brain. Hence the critical faculties and the power of judgment are interfered with, and the individual misjudging his own cerebral activity may feel convinced that it is working better than usual. But the application of such tests as doing rapid calculations shows that this is an error, and that the power of mental work is decreased. Later the perception of sensation is blunted, and in this way the sense of fatigue may be removed. The poisoning gradually extends to the lower centres, and the motor powers of speech and locomotion are finally involved. It is this action of alcohol on the nervous system which so markedly limits its uses as a food. A man may liberate the energy from the alcohol he takes, but, long before any manifest symptoms are produced, his power of judgment and his power of directing the finer actions of his muscles are so interfered with that he is unable to make full use of the energy, not only of that liberated from the alcohol, but also of that liberated from the carbohydrates, fats, and proteins of his food, and thus his working efficiency is decreased. Alcohol may, and does, increase the pleasure of life by paralysing the critical faculty, and it brings comfort to the weary by removing the power of appreciating the sense of fatigue. In fact, its great use is in extreme fatigue, not when more work has to be done, but when the work is over. Then it acts as a stimulant to the heart, to a limited extent as a rapidly available source of energy and as a paralysant to the sense of fatigue. In fever it is sometimes useful in increasing the loss of heat, and thus lowering the temperature. To the normal healthy man it is at best a somewhat dangerous luxury. The uses of alcohol in thermometers and spirit-lamps and as a solvent have been mentioned above. It is also employed as a source of power.

Alcoholism. While formerly the abuse of alcohol was universally regarded either as a vice or a disease, within recent years the view that it constitutes a form of response to a psychological necessity has been strongly advocated. As one of the many exponents of this view has expressed it, 'in the tragic conflict between what he has been taught to desire and what he is allowed to get, man has found in alcohol, as he has found in certain other drugs, a sinister but effective peacemaker, a means of securing, for however short a time, some way out of the prison-house of reality back to the Golden Age.'

According to the theory of Freud and his disciples, mental health depends on a state of equilibrium between instinctive tendencies and the forces by which they are controlled. A failure in this equilibrium entails a more or less painful conflict between the opposing forces, which in normal individuals may be solved by the suppression of the undesirable element, or by seeking adjustment in healthy activities. In subnormal or neurotic individuals, the conflict may result in some form of the neuroses or psychoses, or by escape from its pressure by resort to such a subterfuge as alcohol. The immediate success which follows its use is due to the lessening of the anxiety caused by the conflict. The failure of the expedient to permanently solve the conflict is due to the injurious effect of alcohol upon the higher controlling mental processes, which tends to strengthen the instinctive side of the forces responsible for the conflict, and to the formation of a habit which in its most characteristic form is known as Dipsomania (q.v.).

Tolerance to alcohol varies greatly in different individuals. Some persons are so tolerant that they can go on drinking steadily for years without manifesting any very obvious psychical or physical disturbances. Others, on the other hand, are so intolerant to its use that comparatively small quantities may produce dangerous bodily or mental consequences. In view of that fact, we are bound to assume that persons who develop any of the forms of alcoholism are constitutionally psychopathic.

The symptoms of disease produced by alcoholic

poisoning may be considered under two heads, according as the affection is acute or chronic.

Acute Alcoholism, which is generally caused by the rapid absorption of a large quantity of alcohol, commonly begins with the same train of symptoms —animation of manner, exaltation of spirits, and relaxation of judgment, which lead to want of mental control. The emotions are always altered, and often perverted. The co-ordination of muscular movements is impaired, and they become irregular or ataxic in character. The mechanism of speech is, as a rule, the first to suffer, but other muscular efforts are also rendered imperfect, the erect posture even becoming impossible. Thus far, the initial manifestations are tolerably uniform, but the further development of the symptoms presents three different series of effects. In the ordinary course of the action of the drug, the individual suffers from headache, giddiness, disturbance of sight and hearing, and other troubles due to disorder of the central nervous system, which lead to heavy sleep or profound coma. Usually the individual may be roused from the sleep or coma, but when this is very deep it may be impossible to do so, and he lies completely paralysed, breathing stertorously. Sometimes the alcohol produces such a powerful effect upon the centres of respiration and circulation that death is caused by paralysis of one or other, or both. This condition of coma requires to be carefully distinguished from opium poisoning. In the former, the face is usually flushed and the pupils dilated, while in the latter the face is pale and the pupils contracted; but these appearances are not constant; and it need hardly be added that the odour of the breath is no criterion, inasmuch as the use of spirits is regarded as the panacea in all conditions of depression, and sympathising bystanders are prompt to administer them in every case, often with very hurtful effects. The second class of effects is entirely different from the foregoing. Instead of sinking into sopor or coma, the individual under the influence of the poison becomes more and more excited, bursts into wild mirth or passionate anger, engages in violent struggles with any one who attempts to soothe him, and may do grievous bodily harm to himself or others. This is the condition known as alcoholic mania, and it is the physical explanation of many fearful crimes. After a longer or shorter period of fierce excitement, it is in most cases succeeded by great depression, and sometimes during this condition there may be sudden death from failure of the respiration or circulation. In the third division, the stage of excitement culminates in a convulsive seizure somewhat resembling that seen in hystero-epilepsy. The convulsions, which are repeated at intervals, are very complicated in their character, and produce remarkable contortions of the body. These usually become less violent as they recur, and passing off, end in deep sleep; but here also death may occur from the action of the poison. It should be observed that acute alcoholism is more apt to occur in those who are of unsound mind and weak nervous system, and this applies especially to the two last-described forms of the affection. In the treatment of acute alcoholism, it is sometimes necessary to wash out the stomach in case any alcohol may be present, but from its rapid absorption this is rarely the case. In the profound coma the administration of stimulants, such as ammonia, may be called for, and sometimes artificial respiration may be the only means of saving life. In the maniacal and convulsive forms of the affection, chloral along with bromide of potassium must be used. After the immediate symptoms have passed away in all forms, the individual must be carefully fed, on account of the disturbance of the digestive system which is caused by the overdose of alcohol, with nutrient enemata, along with remedies which will subdue the digestive irritation and stimulate the depression of the nervous system.

Chronic Alcoholism is caused by the prolonged use of overdoses of various alcoholic drinks. The drug causes changes in every tissue of the body, but it more especially affects the nervous, respiratory, and circulatory systems, together with the liver and kidneys. There is always more or less catarrh of the digestive organs, shown by dyspepsia, heartburn, flatulence, nausea, vomiting—especially in the morning—and usually diarrhœa. The liver, to which, in the first instance, all the alcohol absorbed is carried by the vessels, becomes enlarged from congestion in the early stages; and it afterwards shrinks, from the development of fibrous tissue by chronic irritation and the subsequent contraction of this new growth; it exercises pressure on the veins bringing back blood to the heart from the abdominal viscera —thus leading to congestion of the bowels, hæmorrhoids, and hæmorrhages. In some cases there is fatty degeneration of the liver, with or without the fibrous change. From changes in the organs of circulation, there is a tendency to palpitation, fainting, and breathlessness on exertion. These alterations are degenerations of the heart, which may be soft and flabby, or even fatty; fibrous changes in the walls of the arteries; and dilatation of the capillaries from paralysis of the vaso-motor nerves. This last condition gives the florid complexion and mottled appearance to chronic drinkers, and it renders them prone to all inflammations, which, as may be expected, are much more fatal to them than to temperate men. Connected with these changes in the circulation, there is usually some congestion of the kidneys; but it is erroneous to attribute Bright's Disease mainly to alcohol. The lungs are subject to chronic congestion and catarrh of the bronchial tubes and lung-tissues. The muscular system suffers, the muscles becoming flabby and fatty. There is a great tendency to deposition of fat, from interference with digestion, and skin-diseases are frequently induced by the vaso-motor changes.

But of all the symptoms of chronic alcoholism those connected with the nervous system are the most characteristic. The moral sense is impaired, the will-power weakened, and the intellectual energies enfeebled, but there are in addition two characteristic results of the poisonous action of the drug upon the central nervous structures. These are delirium tremens and alcoholic insanity. The former consists in a delirium, varying from quiet wandering to wild mania, marked by hallucinations, usually of a revolting character, such as of creeping reptiles, with tremulousness of the muscles, attended by sleeplessness: the latter may assume many of the clinical aspects of insanity. After death, the morbid anatomy consists in congestion of the membranes of the brain, which are more adherent to the skull and brain than in health; there is usually opacity of the middle or arachnoid membrane, and an increase in the cerebro-spinal fluid. The brain and spinal cord show no definite alterations. The peripheral nervous system also suffers, and there may be pain and tenderness, or loss of sensibility, and tremor, spasm, or paralysis in various areas, according as the sensory or motor nerves are affected. The appearances after death are those of neuritis, or inflammation of the nerves supplying the affected regions. In the treatment of chronic alcoholism, the great point is to put a stop to the employment of alcohol in every form, and this usually requires careful moral discipline. The bodily and mental functions must be invigorated by all means, and an outdoor life is one

of the best. In delirium tremens the patient must have sleep, which may be induced by bromide of potassium and chloral hydrate.

See also the articles on DELIRIUM TREMENS, DIPSOMANIA, INEBRIATES (Retreats for), TEMPERANCE, INSANITY (for alcoholic insanity), SPECIFIC DENSITY (for alcoholometry).—The researches of Miss Elderton at the Galton Laboratory (1910), assisted by Professor Karl Pearson, point to the surprising but comforting conclusion that parental alcoholism has little or no appreciable influence for evil on the physique or intelligence of the offspring, or on its liability to diseases.

Al'coran. See KORAN.

Alcott, LOUISA MAY, a popular American writer, daughter of Amos Bronson Alcott, a noted educationist, was born at Germantown, Pennsylvania, November 29, 1832, was for some years a teacher, and published her *Flower Fables* in 1855. Her life as a volunteer hospital nurse during the civil war furnished material for her *Hospital Sketches* (1865), and supplied a background for several of her tales. She had written for the *Atlantic Monthly*, and published several books before her first and greatest success, *Little Women* (1868), and a second part (1869), which was followed by *Little Men* (1871), with its sequel, *Jo's Boys* (1886). Amongst her numerous other works are *An Old-fashioned Girl* (1869); *Under the Lilacs* (1878); *An Old-fashioned Thanksgiving* (1882); *Proverb Stories* (1882); *Spinning-wheel Stories* (1884); *Lulu's Library* (1885). She died 6th March 1888—two days after her father, AMOS, who was born 29th November (also) 1799. The father, originally a pedlar, became distinguished as a reformer of education and a remarkably successful disciplinarian, his method being of the gentlest. In other respects, though his friend and spiritual master, Emerson, said he had 'singular gifts for awakening contemplation and aspiration in simple and in cultivated persons,' he was a somewhat helpless idealist and transcendentalist. He wrote much for the *Dial*, and published *Conversations with Children on the Gospels* (1837); *Spiritual Culture* (1841); *Table-Talk* (1877); *Sonnets and Canzonets* (1882). See his *Life and Philosophy*, by Sanborn and Harris (1893); and Louisa's *Life, Letters, and Journals*, by Cheney (1889).

Alcoy, a manufacturing town of Spain, on the river Alcoy, 15 miles N. of the town of Alicante. It is 'built in a funnel of the hills, on a tongue of land hemmed in by two streams, with bridges and arched viaducts.' The staple manufacture is paper, especially cigarette-paper. Pop, 34,000.

Alcudia, MANUEL DE GODOY, DUKE OF, a Spanish statesman, was born at Badajoz, 12th May 1767. A mere boy when he came to court, his handsome figure and agreeable manners soon gained him the favour of the queen and of the weak king, Charles IV. He was successively made Duke of Alcudia (taking his title from a small town of that name in Majorca), generalissimo of the forces, and prime minister in 1792. He received the title of 'Prince of the Peace' for his share in the treaty with France, concluded at Basel in 1795. His power, which was at its height in 1807, from that time began to decline. The nobles hated him for his monopoly of political power, while the people ascribed to his ambitious prodigality all the poverty and misery that was the consequence of a long war. When the king abdicated in favour of his son in 1808, Alcudia's life was only saved by the promise of a trial. This trial, however, never took place. Napoleon, who knew his influence over the mind of the Spanish king, had him liberated, and brought to Bayonne, where he instigated all measures taken by the ex-king and queen. After the death of Charles IV. he lived at Paris, and received a small pension from Louis-Philippe. In 1847 his return to Spain was permitted, and his titles, together with great part of his wealth, restored. He died at Paris, 7th October 1851. His *Memoirs* were published (8 vols.) in 1836, and a life of him by D'Auvergne (*Godoy, the Queen's Favourite*) in 1912.

Alcuin (*Ealhwine* or *Albinus*), the adviser of Charlemagne, and a renowned scholar, was born at York about 735, and educated at the cloister school of York, under the care of Archbishop Egbert and Ethelbert, and succeeded the latter as master of the school in 778. Three years later, on his return journey from Rome with the *pallium* of the new Archbishop of York, he met Charlemagne at Parma; and the year after he yielded to the invitation of the monarch, and took up his residence at his court at Aix-la-Chapelle. Here he devoted himself first to the education of the royal family itself, and through his influence the court became a school of culture for the hitherto almost barbarous Frankish empire. Even the great emperor himself sometimes took his place as a pupil in the school, and he gave his master the revenues of three abbeys for his support. In 790 Alcuin was sent to England to renew the peace with King Offa of Mercia. Two years later he returned, and soon afterwards became involved in the controversy against the Adoptian heresy. In 796 he retired from the court, and settled at Tours, of which he had been made abbot. The school here soon became, under his fostering care, one of the most important in the empire, and the nursery for other schools elsewhere. While living at Tours, he corresponded constantly with Charlemagne. He died here in 804. Alcuin is more famous for the influence he exerted than for any work he gave to the world himself. His writings have but little profundity, nor, indeed, have his Latin poems much artistic merit; but he gave a powerful stimulus to Western learning, and occupies a conspicuous place in the history of letters as the apostle of culture and urbanity in a rude and indeed almost barbarous age. His prose writings mainly consist of elementary scholastic works on grammar, rhetoric, and dialectics; theological works, including biblical commentaries, and treatises on the dogma of the Trinity, and on practical morals; lives of several saints—one, Saint Willibrord, especially interesting to Englishmen; and over two hundred letters to Charlemagne, to friends in England, and to Arnulf of Salzburg, his friend and pupil. The best edition of his works is by Frobenius (Ratisbon, 1777). It has been reprinted in Migne's great *Patrologiæ Cursus*, edited by Angelo Mai (1851). See Life by Lorenz (1829); Monnier's *Alcuin et Charlemagne* (1864); Mullinger's *Schools of Charles the Great* (1877); Werner's *Alkuin und sein Jahrhundert* (1881); A. F. West's *Alcuin* (1893); and Gaskoin's *Alcuin, his Life and Work* (1904).

Alcyonaria, one of the two orders of Actinozoa (q.v.), including polyps, with eight tentacles and radial partitions. They usually form colonies, and have always some kind of skeleton. Dead-men's fingers, sea-pens, red corals, and organ-pipe corals, are common representatives of the order.

Alcyonium, or DEAD-MEN'S FINGERS, an exceedingly common cœlenterate of the sub-class Actinozoa, belonging to the same order (Alcyonaria) as the sea-pen, the red coral, the organ-pipe coral, &c. It is often found on the coast, in somewhat deep water, as an irregularly lobed mass of a white, creamy, or orange colour, attached to stones and shells. The whole varied clump, which is frequently about the size of a man's hand, whence the popular name, is not one animal, but a myriad colony. When undisturbed, the countless individual polyps may be seen projecting from

the surface like miniature sea-anemones, about the size of a snail's horns (fig. 1). Each polyp consists of

Fig. 1.
A stock of Alcyonium, showing individual polyps. (After Johnston.)

a contractile tube, with a crown of tentacles round a slit-like mouth, and with the margin of the latter

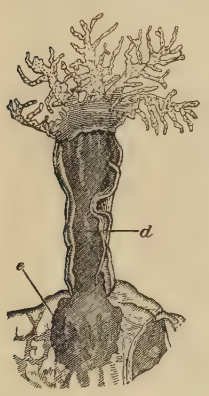


Fig. 2.
Longitudinal section of a single polyp at maximum extension, showing pinnate tentacle round mouth, neck region, protruded stomach tube (*d*), and lower gastral region with suggestion of mesenteries (*e*). (Vogt and Yung.)

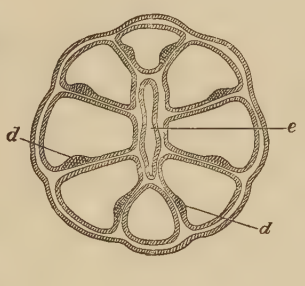


Fig. 3.
Cross section at level of mesenteries (from Vogt and Yung, after Hertwig), showing the body wall with its three layers, the radial mesenteries (*d*) with intervening chambers, and the central much narrowed stomach tube (*e*).

prolonged inwards to form an inner stomach tube, connected with the outer wall by radial partitions or mesenteries (fig. 2). So far the general structure is that of a sea-anemone, but in all Alcyonaria, and in Alcyonium among the rest, there are eight, and not six, tentacles and mesenteries. As in other Alcyonarians, the tentacles are pinnate, and bear very minute stinging cells. The eight mesenteries bear eight filaments, two respiratory and six digestive. The food consists of minute organisms and organic particles. Between the cavities of the polyps which compose the colony there is a gelatinous matrix or cœnenchyma, traversed by canals which connect polyp with polyp. As in all Alcyonarians, the buds, which are continually being formed as the colony grows, arise not directly from the polyps, but from the canals given off by the polyps. In the polyps and in the whole colony there are abundant irregularly shaped calcareous spicules which remain isolated from one another. The genus Alcyonium is widely distributed in temperate and cold waters, usually at no great depth. The common British species is *Alcyonium digitatum*. There are two other compound animals with somewhat similar names, Alcyonidium and Alcyonella, which used also to be ranked as zoophytes, but are now known to belong to the widely separated class of Polyzoa (q.v.). See ALCYONARIA, CŒLENTERATA, SEA-ANEMONE, ZOOPHYTE, &c., and 'Alcyonium' by Professor S. J. Hickson in the *Liverpool Biological Memoirs*.

Fig. 4.
Small Portion of a Colony.

Aldabra, an atoll enclosing a lagoon and cut by channels into four islands, constituting a dependency of the Seychelles, from which it lies nearly 700 miles to the SW. The atoll is about 40 miles in circumference, and a mile and a half in breadth; the land area is about 60 sq. m., and the pop. 130. The rugged coral rock is thickly covered with scrub, mangroves lining the lagoon. The fauna and flora are partly peculiar, partly common to these islands with Madagascar, the Mascarenes, and the Comoro Islands. Aldabra was known to the Arabs by this name ere the Portuguese visited it in 1511, and fell to Britain with the Seychelles in 1810.

Aldborough, a decayed town, now a mere village, of the West Riding of Yorkshire, on the river Ure and on Watling Street, 7½ miles SE. of Ripon. Till 1832 it sent two members to parliament. Extensive remains of the Roman town of Isurium have been found here. Pop. 400. See also ALDEBURGH.

Alde'baran, the Arabic name of a star of the first magnitude in the constellation Taurus. It is the largest and most brilliant of a cluster of five which the Greeks called the Hyades. From its position it is sometimes termed 'the Bull's Eye.'

Aldeburgh, a small seaport and watering-place on the coast of Suffolk, 29 miles NE. of Ipswich by rail. A parliamentary borough since 1572, it was disfranchised in 1832; but in 1885 it received a new municipal charter. It has a quaint, half-timbered Moot Hall; and in the church is a bust of George Crabbe, who was a native, and who delineates the character of the place and its people in his poems. Dr Garrett Anderson, mayor of Aldeburgh in 1908, was the first woman to become mayor of any English borough. Pop. 3000.

Aldegonde. See MARNIX.

Aldegrever, or ALDEGRAF, properly TRIPPENMAKER, HEINRICH (1502–58), a Westphalian engraver and painter, born at Paderborn, lived at Soest. He was a follower of Albrecht Dürer.

Aldehyde, CH_3COH, is a volatile fluid produced by the oxidation and destructive distillation of alcohol and other organic compounds. There are many modes of obtaining it; the following is the method described by Liebig: A mixture of 2 lb. of strong alcohol, 3 lb. of manganese dioxide, 2 lb. of water, and 3 lb. of sulphuric acid is distilled into a receiver kept cool by ice. As soon as the distillate reddens litmus-paper, the operation is stopped. The product in the receiver, weighing about 3 lb.,

is then twice rectified over chloride of calcium, being reduced by these operations to about 12 oz. This is then mixed with twice its volume of ether, and saturated with ammonia gas. After cooling, crystals of aldehyde ammonia, $C_2H_4ONH_3$, are formed, which are mixed with dilute sulphuric acid, and distilled at a low temperature. The hydrated aldehyde thus obtained is dried with chloride of calcium and again rectified by distillation. Aldehyde is a thin, transparent, colourless liquid, very inflammable, burning with a blue flame, and having a spec. gr. of ·800, a boiling-point of about 70° F. (21° C.), a melting-point of – 286° F. (– 121° C.), and a pungent, suffocating odour. It mixes in all proportions with water, alcohol, and ether, and dissolves sulphur, phosphorus, and iodine. As is shown in the article ALCOHOL, it constitutes an intermediate stage in the oxidation of alcohol into acetic acid. When potassium is gently heated with aldehyde, one atom of H is replaced by one of K, the resulting compound being aldehydate of potash, CH_3COK. Various compounds of this kind may be formed, of which the most important is aldehydate of ammonia, or aldehyde-ammonia, $C_2H_4ONH_3$, which is obtained in transparent shining crystals, and is a compound that has led chemists to the discovery of a large number of very remarkable derivatives.

ALDEHYDES are a class of organic compounds intermediate between primary alcohols and acids. Each aldehyde is derived from the corresponding alcohol by the abstraction of two atoms of hydrogen, and each aldehyde is converted into its corresponding acid by the addition of one atom of oxygen.

Ten aldehydes of the series $C_nH_{2n}O$, corresponding to $n = 1, 2, 3, 4, 5, 7, 8, 11, 12$, and 16, are at present known, the simplest being formic aldehyde, CH_2O, and the highest being palmitic aldehyde, $C_{16}H_{32}O$.

Amongst aldehydes not connected with the preceding group may be mentioned various organic compounds which have been recently shown to belong to this class—thus, acrolein, C_3H_4O, is acrylic aldehyde; camphor, $C_{10}H_{16}O$, is campholic aldehyde; bitter-almond oil, C_7H_6O, is benzoic aldehyde; oil of cumin, $C_{10}H_{12}O$, is cuminic aldehyde; oil of cinnamon, C_9H_8O, is cinnamic aldehyde. Most of these aldehydes are obtained directly from plants, and either exist in them ready formed, or are given off as volatile oils on distillation with water. Owing to their great tendency to oxidise into their corresponding acids, the aldehydes are powerful reducing agents. They reduce the silver in silver salts to the metallic state. On the other hand, by the action of nascent hydrogen upon the aldehydes, the corresponding alcohols are regenerated. Thus ordinary alcohol may be obtained from ordinary aldehyde.

Acetic Aldehyde. Ethyl Alcohol.

$$C_2H_4O + H_2 = C_2H_6O.$$

With the acid sulphites of the alkalies the aldehydes form sparingly soluble crystalline compounds. When treated with caustic alkali, many of the aldehydes are converted into the corresponding alcohols, and the potassium salt of the corresponding acid. Thus benzoic aldehyde yields benzyl alcohol and benzoate of potash:

$$2C_7H_6O + KHO = C_7H_8O + KC_7H_5O_2.$$

The aldehydes have a great tendency to form polymeric compounds. Thus ordinary aldehyde passes readily into two polymeric modifications (see ISOMERISM): (1) Par-aldehyde, a liquid which boils at 255° F. (124° C.); (2) Metaldehyde, a solid body which sublimes at 239° F. (115° C.), and is converted back into ordinary aldehyde by heating to 248° F. (120° C.) for a few hours in a closed vessel.

Alder (*Alnus*), a genus of plants of the *Betuleæ* tribe (see also BIRCH), of the natural order Betulaceæ (see also HAZEL, HORNBEAM). This genus consists entirely of trees and shrubs, natives of cold and temperate climates; the flowers in terminal, imbricated catkins, which appear before the leaves; the male and female flowers in separate catkins on the same plant; fruit, a compressed nut without wings.—The COMMON or BLACK ALDER (*A. glutinosa*) is a native of Britain, and

Common Alder (*Alnus glutinosa*).

of the northern parts of Asia and America. It has roundish, wedge-shaped obtuse leaves, lobed at the margin and serrated. The bark, except in very young trees, is nearly black. It succeeds best in moist soils, and helps to secure swampy river-banks against the effects of floods. It attains a height of 30 to 60 feet. Its leaves are somewhat glutinous. The wood is of an orange-yellow colour, not very good for fuel, but affording one of the best kinds of charcoal for the manufacture of gunpowder, and hence was formerly often grown as coppice-wood. Great numbers of small trees were also used in Scotland for making staves for herring-barrels. The wood is employed by turners and joiners; but it is particularly valuable on account of its property of remaining for a long time under water without decay, and is therefore used for the piles of bridges, for pumps, sluices, pipes, cogs of mill-wheels, and similar purposes. The bark when used for tanning produces a yellow or red colour, or with copperas a black colour. The leaves and female catkins are employed in the same way by the tanners and dyers of some countries. The bark is bitter and astringent, and has been used for gargles, and also administered with success in ague. The seeds are a favourite food of greenfinches. In boggy grounds the alder is often almost the only kind of tree, and in many parts of the Highlands groups of alders and of birch are scattered over the lower parts of the mountain slopes.

There are several handsome varieties of the common alder employed in ornamental planting, the most distinct being the GOLDEN ALDER, the leaves of which are bright golden yellow; and the CUT-LEAVED ALDER, with narrow, deeply incised leaves, and a much more graceful habit than the common form. The common alder ceases on the Swedish shore on the lower part of the Gulf of Bothnia.—The GRAY or WHITE ALDER (*A. incana*), a native of many parts of continental Europe, especially of the Alps, and also of North America and of Kamchatka, but not of Britain, differs from the common alder in having acute leaves, downy beneath, and not glutinous, a gray bark, in throwing up many root-suckers, and in producing more and larger nodules on

the roots. The wood is white, fine-grained, and compact, but readily rots under water. The bark is used in dyeing.—*A. cordifolia* is a large and handsome tree, with cordate acuminate leaves, a native of the south of Italy, but found to be quite hardy in England. Some of the American species are mere shrubs. Several species are natives of the Himalayas.—The BERRY-BEARING ALDER, or BREAKING BUCKTHORN, is a totally different plant (see BUCKTHORN).

Alderman, a title derived from the Anglo-Saxon *ealdorman*, compounded of *ealdor* ('older') and *man*. Whether any definite and invariable functions were connected with the ancient rank of *ealdorman* does not seem to be very clearly ascertained. The term was generally applied to persons of high and hereditary distinction, such as princes, earls, and governors. Its special signification in the titles 'Alderman of all England' (*Aldermannus totius Angliæ*) and 'King's Alderman' (*Aldermannus Regis*) is not distinctly indicated. There were also aldermen of counties, hundreds, cities, boroughs, and castles. In modern times, aldermen are officers invested with certain powers in the municipal corporations and counties of England, Wales, and Ireland, either as civil magistrates, or as assessors of the chief magistrates in cities and towns corporate. The title in Scotland is Bailie. The London Court of Aldermen consists of twenty-six aldermen, including the Lord Mayor. The name is now given to the superior county councillors, elected by the councillors, under the Local Government Act of 1888. Women are eligible.

Alderney (Fr. *Aurigny*, Lat. *Riduna*), a British island in the English Channel, 55 miles S. by E. of Portland Bill, 15 NE. of Guernsey, 31 N. of Jersey, and 8½ W. of Cape la Hague. The Race of Alderney, or strait that separates it from the coast of Normandy, is very dangerous in stormy weather. The length of the island is under 4 miles; its extreme breadth, 1½ mile; its area is 1962 acres, or 3 sq. m. The highest point is 281 feet above sea-level. To the S. the coast is bold and lofty; to the N. it descends, forming numerous bays, one of which (Braye) has been formed into a fortified harbour, with a granite breakwater. The scheme proved ill-advised, and after costing about £2,000,000, was suspended in 1871. The Caskets (Casquets) are a small cluster of dangerous rocks, 6¾ miles to the W., on which is a large lighthouse. The soil in the centre of the island is highly productive; and the Alderney cattle (see CATTLE), a small but handsome breed, are celebrated. Agriculture and granite-quarrying are the chief industries. The climate is very sunny and yet bracing. The population was originally French, but thanks to the English garrison and English labourers, English is more generally spoken than in Jersey or Guernsey. Alderney has its own militia. Protestantism has prevailed since the Reformation. Alderney forms part of the bailiwick of Guernsey. The civil power is vested in a judge appointed by the crown, and six *jurats* chosen by the people. These, with twelve popular representatives or *douzeniers* (who do not vote), constitute the local legislature. The 'town' of St Anne is situated in a picturesque valley near the centre of the island; it has a cruciform church (1850) in the Early English style, with a tower 104 feet high. The population of the island is about 3000. See CHANNEL ISLANDS.

Aldershot Camp, a permanent camp of exercise on the confines of Hampshire, Surrey, and Berkshire, 35 miles SW. of London, and 18 S. of Windsor. It was established in 1854–55, during the Crimean War, to provide for practical instruction in tactics, outpost duties, and other exercises requiring a wide tract of country and large bodies of troops, for which no opportunity had previously been given to the British army, except at the temporary camp of Chobham in 1853. The first purchase of land by government was of about 3 square miles, and this area has been greatly increased by subsequent purchases, the total extent of camping and manœuvring ground being now no less than 30½ square miles. The camp has excellent railway communications N., S., E., and W., with direct lines to London, Southampton, Portsmouth, Sandhurst (where are the Royal Military College and the Staff College), and Salisbury, to N. of which the government have another very extensive manœuvre area on Salisbury Plain. Many millions have been spent on accommodation for the troops, including barracks, stores, and ranges, from the huts of the Crimea days to the fine permanent barracks of modern times. These include all the accessories requisite for a military station, which is at once the largest of its kind in the country and also the chief centre of practical military training on a large scale. The camp is therefore the headquarters not only of tactical combined training for combatant troops, cavalry, artillery, infantry, mounted infantry, engineers, but for administrative training of Army Service Corps, Supply and Transport, Ordnance Store, Royal Army Medical Corps. It also contains the signalling, cookery, balloon, mounted infantry, veterinary, medical, sanitation, and gymnastic schools for the army, and has a riding establishment for the training of officers of regulars and yeomanry. Suitable accommodation has been provided for the sovereign's use when he visits the camp to review the troops. The camp is divided into North Camp and South Camp by the Basingstoke Canal. Aldershot is the first of the seven 'commands' into which the British Isles have been divided, and is presided over by a general officer commanding-in-chief, who commands a cavalry brigade and two complete divisions of the expeditionary force, as well as the other troops collected in the command. The average military population (soldiers) amounts to 26,000, and this is greatly augmented during the summer and autumn, when large bodies of Territorials, yeomanry, and officers' training corps visit Aldershot for their annual fortnight in camp. A considerable town has sprung up near the camp. The borough, created in 1921 (in Hants), has a population of 29,000, as against 875 in Aldershot parish in 1851.

Small similar camps exist at the Curragh of Kildare in Ireland, at Shorncliffe near Dover, at Tidworth and Bulford on Salisbury Plain, the last for artillery; but that at Aldershot is at the same time the largest and most complete garrison in the United Kingdom, and the headquarters of practical military work in the field.

Aldhelm, or EALDHELM, ST, born about 640, was educated at Malmesbury and Canterbury, and became abbot of Malmesbury about 673, Bishop of Sherborne in 705. He died in 709. A skilled architect, he built a little church at Bradford-on-Avon in Wiltshire, identified by some with a building still standing, which others believe to be its successor, built in the 10th century. A great scholar, he wrote Latin treatises, letters, and verses, including riddles, besides English poems that have perished. His extant works are published in Dr Giles's *Patres Eccles. Angl.* (Oxford, 1844). See Lives by Bishop Browne (1903) and W. B. Wildman (1905).

Aldine Editions, the name given to the works that issued (1490–1597) from the press of Aldo Manuzio and his family in Venice. Recommended by their intrinsic value, as well as by their handsome exterior, they have been highly prized by the learned and by book-collectors. Many of them are the first editions (*editiones principes*) of Greek and

Roman classics; others contain corrected texts of modern classic writers, as of Petrarch, Dante, or Boccaccio, carefully collated with the MSS. All of them are distinguished for the remarkable correctness of the typography; the Greek works, however, being in this respect somewhat inferior to the Latin and Italian. The editions published by Aldo Manuzio (1450-1515), the father, form an epoch in the annals of printing, as they contributed in no ordinary measure to the perfecting of types. No one had ever before used such beautiful Greek types, of which he got nine different kinds made, and of Latin as many as fourteen. It is to him, or rather to the engraver, Francesco of Bologna, that we owe the types called by the Italians *Corsivi*, and known to us as Italics, which he used for the first time in the 8vo edition of ancient and modern classics, commencing with Virgil (1501). Manuzio's impressions on parchment are exceedingly beautiful; he was the first printer who introduced the custom of taking some impressions on finer or stronger paper than the rest of the edition—the first example of this being afforded in the *Epistolæ Græcæ* (1499). From 1515 to 1533 the business was carried on by his father- and brothers-in-law, Andrea Torresano of Asola, and his two sons—the three 'Asolani.' Paolo Manuzio (1512-74), Aldo's son, possessed an enthusiasm for Latin classics equal to that of his father for Greek; and he was succeeded by his son, the younger Aldo (1547-97). The printing establishment founded by Aldo continued in active operation for 100 years, and during this time printed 908 different works. The distinguishing mark is an anchor, entwined by a dolphin, with the motto either of *Festina lente* or of *Sudavit et alsit*. The demand which arose for editions from this office, and especially for the earlier ones, induced the printers of Lyons and Florence, about 1502, to begin the system of issuing counterfeit Aldines. The Aldo-mania has considerably diminished in later times. Among the Aldine works which have now become very rare, may be mentioned the *Horæ Beatæ Mariæ Virginis* of 1497, the *Virgil* of 1501, and the *Rhetores Græci;* not to mention all the editions, dated and undated, from 1490 to 1497, now extremely rare. See Renouard's *Annales de l'Imprimerie des Aldes* (1834), Didot's *Alde Manuce* (1873), and Omont's *Catalogue* (1892).

Aldred (also Ealdred or Alred) was successively, during the 11th century, abbot of Tavistock, Bishop of Worcester, and Archbishop of York. After his promotion to the see of Worcester in 1044, he undertook several diplomatic missions to the Continent; a journey which he made to Jerusalem in 1058 was a remarkable one for the times. He took an active share in the politics of his time. It has been alleged, on doubtful authority, that he crowned Harold in 1066; he certainly crowned William the Conqueror, and proved a faithful servant to the Norman king. He was active and courageous, but ambitious, greedy, and self-seeking. His appointment to the archbishopric of York in 1060 was confirmed by the pope only on condition that he resigned his former post. Aldred died at York, September 11, 1069. See vols. ii. to iv. of Freeman's *Norman Conquest*.

Aldrich, Henry, born at Westminster in 1647, passed in 1662 from Westminster School to Christchurch, Oxford, of which he became a canon in 1682, and dean in 1689. He designed the Peckwater Quadrangle, and wrote the well-known catch, 'Hark, the bonny Christchurch Bells;' but he is less remembered as architect or composer, or even as an inveterate smoker, than as the author of the *Artis Logicæ Compendium* (1691), of which a new edition appeared in 1862. He died 14th December 1710.

Aldrich, Thomas Bailey, an American poet and novelist, was born at Portsmouth, New Hampshire, U.S., November 11, 1836. While engaged in a New York counting-house, he began to contribute verse to the newspapers, and soon after the publication of *The Bells* (1855), adopted journalism as a profession. He contributed in prose and verse to some of the principal magazines, and from 1881 to 1890 was editor of the *Atlantic Monthly*. Among his novels are *Daisy's Necklace* (1857); *Story of a Bad Boy; Marjory Daw; Prudence Palfrey; Queen of Sheba; Stillwater Tragedy; Two Bites at a Cherry*. He published some eight or nine volumes of poetry, besides collected editions; and produced several books of travel and reminiscences. He died 19th March 1907. His prose was marked by descriptive power and the gift of humour; his verse includes some of the daintiest work yet produced in America.

Aldridge, Ira, negro tragedian, born about 1805 in Senegambia, in 1825 came to Glasgow from New York to study for a missionary career; but next year, forsaking the pulpit for the stage, made his debut as 'Othello' in a small London theatre. He played in the provinces till 1852; then on the Continent won a high reputation, which London refused to indorse (1857); and finally died at Lodz in Poland, 7th August 1867.

Aldrovandi, Ulysses, one of the most distinguished naturalists of the 16th century, was born at Bologna in 1522. He was educated partly in his native city, and partly at Padua. In 1550 he was imprisoned as a heretic at Rome; and after his liberation wrote a treatise on ancient statuary. Having taken his degree in medicine at the university of Bologna in 1553, he occupied successively the chairs of Botany and Natural History there, and practised medicine for some time. He established the Botanical Garden at Bologna in 1567, and was for many years engaged in forming a museum of natural history. All his studies and collections were made subservient to his work on Natural History, the first volume of which—on Birds—appeared in 1599. Six volumes appeared during Aldrovandi's life; other seven were published from his manuscripts after his death, which took place in 1605. His work on Botany was also of great importance, and he was the first to collect a real herbarium, as the word is now understood.

Ale would seem to have been the current name in England for malt liquor in general before the introduction of 'the wicked weed called hops' from the Netherlands, about the year 1524. The two names, *ale* and *beer*, are both Teutonic, and seem originally to have been synonymous. According to the *Alvismál*, a didactic Scandinavian poem of the 10th century, it is called 'ale' among men, and among the gods, 'beer.' The word ale is still the name for malt liquor in the Scandinavian tongues (Swedish, Danish, and Icelandic, *öl*). The hopped liquor came to be called *beer*, and now this is the generic name in the trade for all malt liquors. The popular application of the two words varies in different localities. In the eastern counties of England, and over the greater portion of the country, *ale* means strong, and *beer*, small malt liquor; while in the west country, beer is the strong liquor, and ale the small. As now used, *ale* is distinguished from *beer* chiefly by its strength and the quantity of sugar remaining undecomposed. Strong ale is made from the best pale malt; and the fermentation is allowed to proceed slowly, and the ferment to be exhausted and separated. This, together with the large quantity of sugar still left undecomposed, enables the liquor to keep long without requiring a large amount of hops. The Scotch ales are distinguished for the

smallness of the quantity of hops they contain, and for their vinous flavour. They are fermented at an unusually low temperature. The ales of Edinburgh, Wrexham, and Alloa have a high reputation. Burton ale is the strongest made, containing as much as 8 per cent. of alcohol; while the best brown stout has about 6 per cent., and table-beer only 1 or 2 per cent. India pale ale differs chiefly in having a larger quantity of hops (see BEER and FERMENTATION). For the history of ale in our literature, see an interesting book by John Bickerdyke, *The Curiosities of Ale and Beer* (1886).

Alecsandri. See ALEXANDRI.

Aleman, MATEO, a famous Spanish novelist, was born about the middle of the 16th century, at Seville, and died in Mexico in 1610. He was author of a metrical life of St Antony of Padua (1604), and an *Ortografia Castellana* (1608); but his great work is *Guzman de Alfarache*, a novel with a rascal for the hero, which, first published in Madrid in 1599, in half-a-dozen years had run through twenty-six editions, consisting of not less than 50,000 copies. As regards both delineation of manners and purity of style, this masterly creation ranks next to that most celebrated of all the Spanish 'picaresque' novels, *Lazarillo de Tormes*.

Alemanni, the name of a confederacy of several German tribes which began to appear in the country between the Main and the Danube about the beginning of the 3d century. Caracalla (in 211 A.D.) and Alexander Severus fought against them unsuccessfully; but Maximinus at length drove them beyond the Rhine. After his death they again invaded Gaul, but were defeated and pursued into Germany. After 282, being pressed upon from the north-east by the Burgundians, they took up permanent settlements within the Roman boundary from Mainz to Lake Constance. Julian repelled one of their repeated incursions into Gaul in 357. After the 5th century, the confederated nation is spoken of as Alemanni and Suavi or Suevi. In the course of the 4th century, they had crossed the Rhine, and extended as far west as the Vosges, and south to the Alps. At length Clovis broke their power in 496, making them subject to the Frankish dominion; and the southern part of their territory was formed into a duchy called Alemannia. The name of Swabia came to be applied to the part of the duchy lying east of the Rhine. From the Alemanni the French have given the name of *Allemands* and *Allemagne* to Germans and Germany in general, though the proper descendants of the Alemanni are the inhabitants of the north of Switzerland, of Alsace, and part of Swabia.

Alembert. See D'ALEMBERT.

Alembic (Arabic *al-anbīq*, 'the still') is a form of still introduced into chemistry by the alchemists, and used by the more ancient experimenters in manipulative chemistry for the distillation and sublimation of substances such as alcohol, or formic acid, obtained by heating a decoction of red ants in water. The alembic has now been entirely superseded by the retort and receiver, or by the flask attached to a Liebig's condenser. See RETORT.

Alemte'jo, a former province in the south of Portugal, with an area of 9000 sq. m. It is the largest but most sparsely peopled of the provinces, lies N. of Algarve, and stretched from the Atlantic to the Spanish frontier. It is traversed by a number of mountain-chains, and is watered by the Tagus, Guadiana, and Saado or Sado. In the south and west, the climate is hot and dry; the plains are covered with brown heath, broken at intervals by marshy wastes, while the vegetation is extremely scanty. In the east, on the contrary, the valleys are fertile, and the mountains adorned with forests. The productions include wheat, barley, rice, maize, wine, and fruits. Swine, goats, and sheep are reared; mining, which might be profitably carried on, is neglected. The chief towns are Evora (the capital), Elvas, and Portalegre. Pop. 480,000.

Alençon, chief town of the Norman department of Orne, on the Sarthe, 68 miles SSE. of Caen. The cathedral of Notre Dame (1553–1617) is a Gothic edifice, with good stained glass and the remains of the tombs of the Alençon family, which were almost completely destroyed at the Revolution. The inhabitants produce excellent woollen and linen stuffs, embroidered fabrics, straw-hats, lace-work, artificial flowers, hosiery, &c. The manufacture of the famous Alençon point-lace (*point d'Alençon*) employs barely a tenth part of the 20,000 hands that once engaged in it (see LACE). The cutting of the so-called Alençon diamonds (quartz-crystals), found in the vicinity of the town, is a decayed industry. Pop. 16,000.

The old Dukes of Alençon were a branch of the royal family of Valois, being descended from Charles of Valois, who perished at the battle of Crécy in 1346. His grandson, John I., fell at Agincourt in 1415. René, son of John II., was confined by Louis XI. for three months in an iron cage at Chinon. René's son, who had married the sister of Francis I., commanded the left wing at the battle of Pavia. With him expired the old House of Alençon. The duchy was then given to the Duke of Anjou, brother of King Charles IX. Louis XIV. conferred it upon his grandson the Duc de Berri, and Louis XVI. on his brother the Comte de Provence. More recently the title has been borne by the son of the Duc de Nemours, who was son of Louis-Philippe.

Aleppo (Italianised form of *Haleb*), a Syrian town, till the Great War capital of a Turkish province between the Orontes and the Euphrates, in a fruitful valley watered by the Kuweik. It stands in a large hollow, surrounded by rocky hills of limestone, and beyond is mere desert. The fruitful gardens, celebrated for their excellent plantations of pistachios, are the sole contrast to the desolation which environs the city, whose numberless cupolas and minarets, clean, well-paved streets, and stately houses, make it even yet one of the most beautiful in the East. Formerly it was a principal emporium of trade between Europe and Asia, and was the centre of many of the chief trade routes; especially before the discovery of the sea route to India. It supplied a great part of the East with fabrics of silk, cotton, and wool, and gold and silver stuffs; but in 1822 an earthquake swallowed up two-thirds of the inhabitants, and transformed the citadel into a heap of ruins. The plague of 1827, the cholera of 1832, and the oppression of the Egyptian government, all but completed its destruction. It has only partially recovered from its misfortunes, but is still the principal emporium of the inland commerce of Northern Syria. Its port is Alexandretta or Scanderoon. Aleppo has a large trade in cotton and silk goods, skins, tobacco, wine, and oil; and manufactures much-admired cloth (of silk, cotton, wool; flowered and striped), carpets, cloaks, and soap. English goods are largely imported, and the exports are considerable. The trade is mainly in the hands of the native Christians (Greeks and Armenians), who may number 20,000, and have superseded the European houses that used to be established here. The Jews, 5000 in number, are a very important and wealthy community, occupying a special quarter of the city. The Mohammedans here are less bigoted than in some other cities of Syria; but religious riots sometimes occur —notably in 1850 and 1862. The climate is dry

and not unhealthy; but residents are subject to a painful disorder called Aleppo boils, which most usually break out in the faces of children, last for a year or more, and disfigure the countenance badly. The pop., believed to have been formerly 300,000, was estimated in 1914 at 200,000. Aleppo was connected with Damascus by railway in 1900. It was occupied by the British in October 1918.

Aleshki (formerly *Dnieprovsk*), a town of Taurida, near the Dnieper, and 3 miles from Kherson, noted for its melon-culture and its fisheries; pop. 9500.

Alesia, a town in the east of ancient Gaul, the siege and capture of which formed one of Cæsar's greatest exploits. Vercingetorix, after several defeats, had shut himself up with 80,000 Gauls in Alesia, which was situated on a lofty hill. Cæsar, with his army of 60,000 men, completely surrounded the place; and in spite of the desperate efforts of the besieged, the town was obliged to surrender. Alesia was destroyed by the Normans in 864. Near the site stands the modern village of Alise-Sainte-Reine, in Côte d'Or, W. of Dijon. On the hill Napoleon III. erected in 1864 a colossal statue of Vercingetorix.

Alesius, ALEXANDER, a noted divine and Reformer, whose name was originally Alane, was born in Edinburgh on 23d April 1500. He studied at St Andrews, and became canon of the collegiate church there. Won over to the side of the Reformers, he was obliged to flee to the Continent, and in his absence he was tried and condemned. He eventually settled down at Wittenberg, signed the Augsburg Confession, and gained the friendship of Melanchthon. In 1535 Alesius came over to England, was well received by Cranmer and Cromwell, and lectured at Cambridge; but the 'Six Articles' compelled him to return to Germany, where he held theological chairs in the universities of Frankfort-on-the-Oder and Leipzig. He died 17th March 1565. He wrote some thirty exegetical and polemical works.

Alessandria, the principal fortress and town of the province of the same name in the north of Italy, is situated in a marshy country near the confluence of the Bormida and Tanaro, 58 miles ESE. of Turin. It was built in 1168 by the inhabitants of Cremona, Milan, and Placentia, as a bulwark against the Emperor Frederick I., and was afterwards called Alessandria in honour of Pope Alexander III. It was taken and plundered in 1522 by Duke Sforza, besieged by the French in 1657, and again taken by Prince Eugene in 1707. In 1800 Bonaparte here concluded an armistice. It was the principal stronghold of the Piedmontese during the insurrection of 1848-49. The citadel is still one of the strongest fortresses in Italy, of enormous size, larger than many a town; and in war the whole surrounding country can be inundated by means of the sluices of the Tanaro. The city contains, exclusive of the garrison, (1911) 75,687 inhabitants, who trade in linens, woollens, silk fabrics, stockings, and wax-candles. The richly decorated cathedral was rebuilt in 1823. Two great fairs are held annually. The city is the meeting-point of several railway lines.—The province, noted for wines, has an area of 1980 sq. m., and a pop. of 800,000. It is a fertile plain on the east, and the west is hilly, with rich wooding.

Alessio, an Adriatic port of Albania, at the mouth of the Drin, 17 miles SE. of Scutari, occupied by the Montenegrins and Serbians in 1911, the Austrians in 1916, and the Italians in 1918; pop. 3000.

Aletsch, the largest glacier (12½ miles long) in Europe, sweeps round the southern side of the Jungfrau. Following the valley in a majestic curve, it is distinguished by the title Great Aletsch from its two tributary glaciers, the Upper and Middle Aletsch, which branch off to the north-west. At its eastern extremity lies a deep-blue mountain lake, the Merjelen-See (7711 feet), into which huge blocks of detached ice frequently fall. To the NW. lies the Aletschhorn (13,773 feet), the second highest peak in the Bernese Alps, which was first ascended by Mr Tuckett in 1859.

Aleurites. See CANDLE-NUT.

Aleurone, a protein found in many seeds.

Aleutian Islands, a chain of about 150 islands, in several groups, extending westward from the American peninsula of Aliaska, and forming an insular continuation of that peninsula towards the Asiatic peninsula of Kamchatka. These islands are chiefly included in the United States territory of Alaska, and lie in lat. 53° N., separating the Sea of Kamchatka on the north from the Pacific Ocean on the south, and are naturally divided into five groups, ranging from east to west in the following order: (1) The Fox Islands, near the extremity of Aliaska, of which the largest, Oonimak, is also the largest of the Aleutian chain; other principal islands of this group are Oonalashka and Oomnak. (2) The Andreanov Islands, of which the largest is Atka. (3) The Rat (Kreesi) Islands, of which the most important are Keeska, Amchitka, and Semisopochnoi. (4) The Blizhni (Nearer) Islands, so called by the Russians from their nearer proximity to Kamchatka; of these the largest is Attoo, the westernmost of the true, or American, Aleutian Islands. (5) Komandorski, or Commander's Islands, a Russian group, lying near Kamchatka, the principal being Behring Island, named from Behring (Bering), a commander in the Russian service, who died here in 1741.

This chain of islands, apparently a continuation of the main Alaskan range of mountains, contains numerous volcanic peaks, some of which are in a state of moderate activity. In some instances these peaks rise from 4000 to 8000 feet high, and are covered with snow. Few trees, and those of stunted growth, are found on these islands, but grasses grow in abundance. Some efforts have been made to cultivate the more common garden vegetables, but with indifferent success.

The aborigines of these islands are believed to have been of Eskimo origin, but from their subjugation by adventurous Russians about the middle of the 18th century, such intimate relations with their conquerors were maintained that they have largely lost their tribal characteristics. They profess the religion of the Greek Church. At Iliuliuk, on the island of Oonalashka, are a church, the custom-house, and important trading establishments. The islands abound in springs, and are overrun with foxes, dogs, and reindeer; while the coasts swarm with fish and seals. The inhabitants, once 30,000, are now about 2000. They hunt and fish, and their trade is chiefly in furs and fish. In summer they live in tents or booths, in winter in huts of stone or snow, or underground retreats.

See Greely's *Handbook of Alaska* (1909) and other books named at Alaska.

Alewife (*Alosa tyrannus*), a fish of the same genus with the Shad (q.v.), which, in the end of spring and beginning of summer, appears in great numbers on the eastern coast of North America, and enters the mouths of rivers to spawn. It appears in Chesapeake Bay in March, on the coasts of New York and New England in April, and on those of the British provinces about the 1st of May. It abounds in the Bay of Fundy, but is more rare in the Gulf of St Lawrence; and the Bay of Miramichi appears to be its northern limit. It ascends

rivers only as far as the tide extends, and after spawning, returns to the sea in the middle of summer. It prefers a soft, muddy bottom. Its length is not more than 12 inches. The alewife is called *spring herring* in some places, and *gaspereau* by the French Canadians. In the United States it is considered much superior to the herring. The fishery is prosecuted in the rivers, by small-meshed seine-nets set across the stream. Large quantities are taken in the rivers of New England, New Brunswick, and Nova Scotia. The harbour of St John, New Brunswick, alone produces from 12,000 to 20,000 barrels annually. This fish, in a salted state, forms a considerable article of export from the northern parts of America to the West Indies.

Alexander the Great, son of Philip of Macedon and Olympias, daughter of Neoptolemus of Epirus, was born at Pella, 356 B.C. His mind was formed chiefly by Aristotle, who instructed him in every branch of human learning, especially in the art of government. Alexander was 16 years of age when his father marched against Byzantium, and left the government in his hands during his absence. Two years afterwards, he displayed singular courage at the battle of Chæronea (338 B.C.), where he overthrew the Sacred Band of the Thebans. 'My son,' said Philip, as he embraced him after the conflict, 'seek for thyself another kingdom, for that which I leave is too small for thee.' The father and son quarrelled, however, when the former divorced Olympias. Alexander took part with his mother, and fled to Epirus, to escape his father's vengeance; but receiving his pardon soon afterwards, he returned, and accompanied him in an expedition against the Triballi, when he saved his life on the field. Philip, being appointed generalissimo of the Greeks, was preparing for a war with Persia, when he was assassinated (336 B.C.), and Alexander, not yet twenty years of age, ascended the throne. After punishing his father's murderers, he marched on Corinth, and in a general assembly of the Greeks he caused himself to be appointed to the command of the forces against Persia. On his return to Macedon, he found the Illyrians and Triballi up in arms, whereupon he forced his way through Thrace, and was everywhere victorious. But now the Thebans had been induced, by a report of his death, to take up arms, and the Athenians, stimulated by the eloquence of Demosthenes, were preparing to join them. To prevent this coalition, Alexander rapidly marched against Thebes, which, refusing to surrender, was conquered and razed to the ground. Six thousand of the inhabitants were slain, and 30,000 sold into slavery; the house and descendants of the poet Pindar alone being spared. This severity struck terror into all Greece. The Athenians were treated with more leniency.

Alexander, having appointed Antipater his deputy in Europe, now prepared to prosecute the war with Persia. He crossed the Hellespont in the spring of 334 B.C., with 30,000 foot and 5000 horse, attacked the Persian satraps at the river Granīcus, and gained a complete victory, overthrowing the son-in-law of Darius with his own lance. As a result of the battle, most of the cities of Asia Minor at once opened their gates to the conqueror. Alexander restored democracy in all the Greek cities; and as he passed through Gordium, cut the Gordian-knot (q.v.), which none should loose but the ruler of Asia. During a dangerous illness at Tarsus, brought on by bathing in the Cydnus, he received a letter insinuating that Philip, his physician, had been bribed by Darius to poison him. Alexander handed the letter to Philip, and at the same time swallowed the draught which the latter had prepared. As soon as he recovered, he advanced towards the defiles of Cilicia, in which Darius had stationed himself, with an army of 600,000 men. He arrived in November 333 B.C. in the neighbourhood of Issus, where, on the narrow plain between the mountains and the sea, the unwieldy masses of the Persians were thrown into confusion by the charge of the Macedonians, and fled in terror. On the left wing, 30,000 Greek mercenaries held out longer, but they, too, were at length compelled to yield. All the treasures as well as the family of Darius fell into the hands of the conqueror, who treated them with the greatest magnanimity. Overtures for peace, made by Darius on the basis of surrendering to Alexander all Asia west of the Euphrates, were rejected. Alexander now turned towards Syria and Phœnicia. He occupied Damascus, where he found princely treasures, and secured to himself all the cities along the shores of the Mediterranean. Tyre, confident in its strong position, resisted him, but was conquered and destroyed, after seven months of incredible exertion (332 B.C.). Thence he marched victoriously through Palestine, where all the cities submitted to him except Gaza; it shared the same fate as Tyre. Egypt, weary of the Persian yoke, welcomed him as a deliverer; and in order to strengthen his dominion here, he restored all the old customs and religious institutions of the country, and founded Alexandria in the beginning of 331 B.C. Thence he marched through the Libyan Desert, in order to consult the oracle of Ammon, whose priest saluted him as a son of Zeus; and he returned with the conviction that he was indeed a god. He then again set out to meet Darius; in October 331 B.C., a great battle was fought on the plain stretching eastward to Arbela. Notwithstanding the immense superiority of his adversary, who had collected a new army of more than a million men, Alexander was not for a moment doubtful of victory. Heading the cavalry himself, he rushed on the Persians, and put them to flight; then hastened to the assistance of his left wing, which, in the meanwhile, had been sorely pressed. He was anxious to make Darius a prisoner, but Darius escaped on horseback, leaving his baggage and all his treasures a prey to the conqueror. Babylon and Susa, the treasure-houses of the East, opened their gates to Alexander, who next marched towards Persepolis, the capital of Persia, which he entered in triumph.

The marvellous successes of Alexander now began to dazzle his judgment and to inflame his passions. He became a slave to debauchery, and his caprices were as cruel as they were ungrateful. In a fit of drunkenness, and at the instigation of Thaïs, an Athenian courtesan, he set fire to Persepolis, the wonder of the world, and reduced it to ashes; so at least says legend. Then he set out with his cavalry in pursuit of Darius. Learning that Bessus, the Bactrian satrap, held him a prisoner, he hastened his march, in the hope of saving him, but he found him mortally wounded (330 B.C.). He mourned over his fallen enemy, and caused him to be buried with all the customary honours; whilst he hunted down Bessus, who himself aspired to the throne, chasing him over the Oxus to Sogdiana (Bokhara). Having discovered a conspiracy in which the son of Parmenio was implicated, he put both father and son to death, though Parmenio himself was innocent of any knowledge of the affair. This cruel injustice excited universal displeasure. In 329 he penetrated to the furthest known limits of Northern Asia, and overthrew the Scythians on the banks of the Jaxartes. In the following year he subdued the whole of Sogdiana, and married Roxana, whom he had taken prisoner. She was the daughter of Oxyartes, one of the enemy's captains, and was

said to be the fairest of all the virgins of Asia. The murder of his foster-brother, Clitus, in a drunken brawl, was followed, in 327 B.C., by the discovery of a fresh conspiracy, in which Callisthenes, a nephew of Aristotle, was falsely implicated. For challenging Alexander's divinity, he was cruelly tortured and hanged.

In 326 B.C., proceeding to the conquest of India, hitherto known only by name, Alexander crossed the Indus near to the modern Attock, and pursued his way under the guidance of a native prince to the Hydaspes (Jhelum). He there was opposed by Porus, another native prince, whom he overthrew after a bloody contest, and there he lost his charger Bucephalus (q.v.); thence he marched as lord of the country through the Punjab, establishing Greek colonies. He then wished to advance to the Ganges, but the general murmuring of his troops obliged him, at the Hyphasis (modern Sutlej), to commence his retreat. On regaining the Hydaspes, he built a fleet, and sent one division of his army in it down the river, while the other followed along the banks, fighting its way through successive Indian armies. At length, having reached the ocean, he ordered Nearchus, the commander of the fleet, to sail thence to the Persian Gulf, while he himself struck inland with one division of his army, in order to return home through Gedrosia (Beluchistan). During this march his forces suffered fearfully from want of food and water. Of all the troops which had set out with Alexander, little more than a fourth part arrived with him in Persia (325 B.C.). At Susa he married Stateira, the daughter of Darius, and he bestowed presents on those Macedonians (some 10,000 in number) who had married Persian women, his design being to unite the two nations. He also distributed liberal rewards among his soldiers. Soon afterwards he was deprived, by death, of his favourite Hephæstion. His grief was unbounded, and he interred the dead man with kingly honours. As he was returning from Ecbatana to Babylon, it is said that the Magi foretold that the latter city would prove fatal to him; but he despised their warnings. On the way, he was met by ambassadors from all parts of the world —Libya, Italy, Carthage, Greece, the Scythians, Celts, and Iberians. At Babylon he was busy with gigantic plans for the future, both of conquest and civilisation, when he was suddenly taken ill after a banquet, and died eleven days later, 323 B.C., in the 33d year of his age, and the thirteenth of his reign. His body was deposited in a golden coffin at Alexandria, by Ptolemæus, and divine honours were paid to him, not only in Egypt, but in other countries. He had appointed no heir to his immense dominions; but to the question of his friends, 'Who should inherit them?' he replied, 'The most worthy.' After many disturbances, his generals recognised as kings the weak-minded Aridæus—a son of Philip by Philinna, the dancer—and Alexander's posthumous son by Roxana, Alexander Ægus, while they shared the provinces among themselves, assuming the title of satraps. Perdiccas, to whom Alexander had, on his death-bed, delivered his ring, became guardian of the kings during their minority. The empire of Alexander soon broke up, and his dominions were divided amongst his generals. See GREECE, PTOLEMY, SELEUCIDÆ.

Alexander was more than a conqueror. He diffused the language and civilisation of Greece wherever victory led him, and planted Greek kingdoms in Asia, which continued to exist for some centuries. At the very time of his death, he was engaged in devising plans for the drainage of the unhealthy marshes around Babylon, and a better irrigation of the extensive plains. It is even supposed that the fever which he caught there, rather than his famous drinking-bout, was the real cause of his death. To Alexander the ancient world owed a vast increase of its knowledge in geography and natural history; and he taught Europeans the road to India. See Freeman's *Historical Essays* (1873); Curteis, *Rise of the Macedonian Empire* (1878); Mahaffy, *Alexander's Empire* (1887); Dodge, *Alexander* (Boston, 1890); Wheeler (1900); German works by Kaerst (1887) and Droysen (1885), and French by Joubert (1889).

The wonderful element in the campaigns of Alexander, and his tragical death at the height of his power, threw a rare romantic interest around his figure. It is ever the fate of a great name to be enshrined in fable, and Alexander soon became the hero of romantic story, scarcely more wonderful than the actual, but growing from age to age with the mythopœic spirit which can work as freely in fact as fiction. The earliest form of the story which we know is the great romance connected with the name of Callisthenes, which, under the influence of the living popular tradition, arose in Egypt about 200 A.D., and was carried through Latin translations to the West, through Armenian and Syriac versions to the East. It became widely popular during the middle ages, and was worked into poetic form by many writers in French and German. Alberich of Besançon wrote in Middle High German an epic on the subject in the first half of the 12th century, which was the basis of the German 'Pfaffe' Lamprecht's *Alexanderbuch* (ed. by Hinzel, Halle, 1884), also of the 12th century. The French poets Lambert li Court and Alexandre de Bernay composed, between 1180 and 1190, a romance of Alexander, the twelve-syllable metre of which gave rise to the name *Alexandrines*. The German poem of Rudolf of Ems was based on the Latin epic of Walter of Châtillon, about 1200, which became henceforward the prevailing form of the story. In contrast with it is the 13th-century English epic of Alexander (in vol. i. of Weber's *Metrical Romances*, 1810), based on the Callisthenes version. The story appears also in the East, worked up in conjunction with myths of other nationalities, especially the Persian. It appears in Firdusi, and, among later writers, in Nizami. From the Persians both the substance of the story and its form in poetical treatment have extended to Turks and other Mohammedans, who have interpreted Alexander as the *Dsulkarnein* ('two horned') of the Koran, and to the Hindus, which last had preserved no independent traditions of Alexander. See Spiegel, *Die Alexandersage bei den Orientalen* (1851); Paul Meyer, *Alexandre le Grand dans la Littérature Française au Moyen-âge* (1886); works by Nöldeke (1890) and Hilka (1911).

Alexander I., king of Scotland, the fourth son of Malcolm Canmore, was born about 1078, and in 1107 succeeded his brother, Edgar, only however to that part of the kingdom north of the Firths of Forth and Clyde (see DAVID I.). He married Sibylla, a natural daughter of Henry I. of England, and his reign was comparatively untroubled, though about 1115 he had to quell an insurrection of the northern clans. He founded the abbeys of Scone and Inchcolm, and initiated a diocesan episcopate; whilst his determined resistance to the claims of York and Canterbury to supremacy over the see of St Andrews, did much to secure the independence, not only of the Scottish Church, but of Scotland itself. He died at Stirling in 1124.

Alexander II., born at Haddington in 1198, succeeded his father, William the Lion, in 1214. He early displayed that wisdom and strength of character, in virtue of which he holds so high a

place in history among Scottish kings. The first act of his reign was to enter into a league with the English barons who had combined to resist the tyranny of King John. This drew down upon him and his kingdom the papal excommunication; but two years later, the ban was removed, and the liberties of the Scottish Church were even confirmed. On the accession of Henry III. to the English throne, Alexander brought the feuds of the two nations to a temporary close by a treaty of peace (1217), in accordance with which he married Henry's eldest sister, the Princess Joan (1221). The alliance thus established was broken after the death, without issue, of Queen Joan (1238), and the second marriage of Alexander with the daughter of a noble of France. In 1244 Henry marched against Scotland, to compel Alexander's homage. In this emergency, the Scottish king received the steady support of the barons, whose ordinary policy was opposition to the crown, and, according to Matthew Paris, he found himself, in a short time, at the head of 100,000 foot and 10,000 horse. A peace was concluded without an appeal to arms. In 1249, while engaged in an expedition to wrest the Hebrides from Norway, Alexander died of fever at Kerrera, a small island opposite Oban. During his reign, Argyll and Galloway were brought into subjection to the crown.

Alexander III., born in 1241, succeeded his father, Alexander II., at the age of eight, and two years later married the Princess Margaret, eldest daughter of Henry III. of England (1251). His tender age enabled Henry to prosecute successfully for a time his schemes for obtaining entire control over Scotland; but long before he reached manhood, Alexander displayed so much energy and wisdom as to give assurance that when the administration of affairs should come into his hands, it would be vain to think of reducing him to submission. Very shortly after he had come of age, his energies were summoned to the defence of his kingdom against the formidable invasion of Haco, king of Norway (1263), who claimed the sovereignty of the Western Isles. In attempting a landing at Largs, on the coast of Ayr, the Norwegian prince sustained a total defeat; and Alexander, as the result of this important victory, secured the allegiance both of the Hebrides and of the Isle of Man. The alliance between Scotland and Norway was strengthened in 1282 by the marriage of Alexander's only daughter, Margaret, to Eric, king of Norway. This princess died in the following year, leaving an infant daughter, Margaret, commonly designated the Maid of Norway, whose untimely death, on her way to take possession of her throne, was the occasion of so many calamities to Scotland. During the concluding years of Alexander's reign, the kingdom enjoyed a peace and prosperity which it did not taste again for many generations. The justice, liberality, and wisdom of the king endeared his memory to his subjects, while the misfortunes that followed his death, heightened the national sense of his loss. His only surviving son, who had married the daughter of Guy, Count of Flanders, died without issue in 1284; and in the next year, Alexander contracted a second marriage with Joleta, daughter of the Count de Dreux. The hopes of the nation were soon after clouded by his untimely death. Riding on a dark night between Burntisland and Kinghorn, he fell with his horse, and was killed on the spot, 12th March 1286. A monument (1887) marks the scene of his death.

Alexander I., Emperor and Autocrat of All the Russias (1801–25), was born in 1777. His father, Paul (q.v.), had no control over his education; it was conducted by his grandmother, the Empress Catharine, with the help chiefly of Laharpe, a Swiss; and the young prince was brought up in the most advanced and enlightened opinions of the 18th century. His mother was Maria of Württemberg. In 1793 he married Elizabeth of Baden, and, on the assassination of his father in 1801, succeeded him upon the throne. Alexander knew of the conspiracy to dethrone his father, but he was in no way privy to his murder. The young ruler seemed deeply penetrated with a sense of his obligation to make his people happy and to promote their civilisation and prosperity. Many changes were at once initiated. Education was promoted; the universities of Moscow, Vilna, and Dorpat were remodelled; and new ones were founded at Kazan, Kharkoff, and St Petersburg. Steps were taken for alleviating serfdom. The press-censorship was relaxed, and a milder system of administration was introduced.

The accession of Alexander was soon—most distinctly—felt in the conduct of foreign affairs. In 1801 he concluded a convention with Britain, renouncing the Armed Neutrality and putting an end to hostilities. He next entered, along with France, into negotiations respecting the indemnification of the minor states in Germany and Italy; but discovering how little Napoleon intended any real compensation, he broke with France, and joined the coalition of 1805. He was present at the battle of Austerlitz, where the allied armies of Austria and Russia were defeated, and retired with the remains of his forces into Russia, declining to enter into the treaty that followed. Next year, he came forward as the ally of Prussia; but after the battles of Eylau and Friedland, in 1807, he was obliged to conclude the peace of Tilsit, in which he managed to prevent the restoration of the kingdom of Poland, and to mitigate the hard fate of the king of Prussia. During the war with France, Alexander had also to carry on hostilities with Persia and with Turkey.

In pursuance of the stipulations of Tilsit, Alexander acceded with his huge empire to the French Continental System, thus altering entirely the foreign policy of Russia. He began by declaring war on Britain in 1808, and, attacking her ally Sweden, wrested from that country the province of Finland. In the war of France against Austria in 1809, Alexander took only a lukewarm part. Against the Porte he renewed the war, which was continued till the peace of Bucharest in 1812.

The unnatural alliance of Alexander with Napoleon could not, however, be maintained. The pressure of the continental system on the material resources of Russia, the despotic changes made by Napoleon, the augmentation of the duchy of Warsaw, the proffers of alliance by England and Sweden, awoke in Alexander the thought of a decisive contest against the subjugator of Europe and the disturber of the peace of the world. When this gigantic struggle at last began (1812), Russia brought into the field an army of 300,000 men. During the French invasion, Alexander was not present with his troops, but he took an active part in the great struggles of 1813 and 1814. At the occupation of Paris after the downfall of Napoleon in 1814, Alexander was the central figure of the politics and diplomacy of the time. His courtesy, humanity, and regard for the feelings and interests of the French, won for him a personal regard amounting to enthusiasm. He was received with the same feeling in London, which he visited after the treaty of Paris in June 1814. After a short residence in his own capital, he repaired to the Congress of Vienna. Here he laid claim to Poland as essential to the interests of Russia, but promised to confer on it a constitution. On the return of Napoleon from Elba, Alexander urged the energetic prosecution of the war against the common enemy;

yet on this occasion, too, France owed much to his generosity.

In the end of October 1815, Alexander returned to his own dominions. Under his guidance, Russia had become the leading power on the Continent; the limits of the empire had extended; and notwithstanding the war, the earlier legislative reforms had begun to act favourably on the industry and well-being of the nation. At Paris, Alexander had met Madame Krüdener, who gave a new direction to his mind, and his French ideas gave place to a decided pietism, with sympathies for Protestant and English ways of thinking. The British and Foreign Bible Society established itself at St Petersburg with great success. Alexander received a deputation of Quakers, and prayed and wept with them. The most important political outcome of this period was the Holy Alliance (q.v.), founded by Alexander, and accepted by all the leading Christian countries of Europe, except Britain. Many causes contributed to force Alexander into a reactionary course. He yielded to the influence of Metternich, the celebrated Austrian statesman, and the Holy Alliance became an instrument of political reaction throughout Europe. At home he adopted severe measures of repression, which were in entire contradiction to the principles of his youth.

The progress of the revolt in Greece brought the policy of the emperor into complete opposition to the deepest sympathies of the nation. The Russian people were profoundly interested in the Greek struggle; but the emperor condemned the rising as insurrection. The death of his only and much-loved natural daughter, the terrible inundation suffered by St Petersburg in 1824, in which he exposed himself to personal danger, and the alarm caused by a Russo-Polish conspiracy against all the members of the House of Romanof, contributed not a little to break the heart of the emperor, and completely destroy the composure of his mind. Weary with the burden of governing a vast empire, not yet ripe for the advanced views which he himself cherished, he commenced, in September 1825, a journey to the Crimea for the benefit of his health. He died at Taganrog, December 1, 1825. It is reported that about this time he was heard to repeat: 'And yet men may say of me what they please, I have lived and will die a republican.' The rumour that he had been poisoned is altogether groundless. Shortly before his death, he learned the details of the conspiracy which his brother and successor, Nicholas I. (q.v.), had put down.

See vol. x. of the *Cambridge Modern History* (1907); Hodgetts, *The Court of Russia in the 19th Century* (1908).

Alexander II., Emperor of Russia (1855–81), was born April 29, 1818. He was carefully educated by his father, Nicholas, who professed himself delighted with the manifestations of 'true Russian spirit' in his son. At sixteen, he was declared of age, made commandant of the Lancers of the Guard, Hetman of the Cossacks, first aide-de-camp of the emperor, and subjected daily to a life of manœuvring, reviewing, and military parade, which at last seriously injured his health. He then travelled through Germany to recruit his energies, and while there in 1841, concluded a marriage with the Princess Marie (1824–80), daughter of the Grand-duke of Hesse. He now vigorously applied himself to his duties as chancellor of the university of Finland. By his dexterous and winning manners, he found his way to the hearts of the Finns, and weakened their ancient love of independence. On his accession to the throne, March 2, 1855, he found himself in a very critical position. He had two parties to conciliate—the old Muscovite party, zealous for the prosecution of the Crimean war, and the more peaceable portion of the nation, with whom he sympathised. By temporising he was enabled to conclude a peace. Throughout his reign, he had to hold the balance between Conservatives and extreme Radicals, but succeeded in guiding and promoting reform. The grand achievement of his reign was the emancipation, which had been contemplated by Nicholas I., of the serfs—23,000,000 souls—in 1861. Reforms of the tribunals, of civil and criminal procedure, and of municipal institutions followed. In 1865 Alexander established elective representative assemblies in the provinces. He resisted strenuously all foreign interference with Polish affairs during the insurrection of 1863, which was suppressed with great severity. During his reign, the Russian empire was widely extended in two important regions, in the Caucasus and in Central Asia. The capture of Schamyl, the famous Circassian chief, in 1859, closed in favour of Russia her long struggle with the tribes of that country. In 1864 Russia began her decided advance against the khanates of Central Asia, and in a few years reduced them all more or less completely to subjection. During the Franco-German war of 1870–71, Alexander maintained a very sympathetic attitude towards Germany, a policy which was continued and extended in subsequent alliances both with that country and Austria. The marriage of his only daughter Marie with the Duke of Edinburgh in 1874 had no permanent effect in allaying the mutual jealousies of Russia and England. The Czar shared the national sympathy with the Slavic races under Turkish rule, and took the field with the army during the momentous war between Russia and Turkey in 1877–8. But the most remarkable feature of the second half of his reign was the struggle of the Russian autocracy with the revolutionary party, called Nihilists. Like his uncle, Alexander I., he was personally a liberal and humane monarch, but he could not keep pace with the more forward portion of his subjects; hence the reactionary tendency of many of his later measures. His government repressed the revolutionists most severely, and they sought vengeance by attacking the person of the Czar and his officers. Repeated attempts were made to assassinate Alexander. In 1879 he was shot at in his capital; in the same year, the train in which he was supposed to be travelling was blown up by an elaborate mine beneath the railway; in 1880 a violent and destructive explosion was effected by dynamite below the imperial apartments in the Winter Palace at St Petersburg. On 13th March 1881 he was fatally injured by a bomb thrown at him near his palace.

See Lives by Laferté (pen-name of his morganatic wife, 1882) and Tatistshev (1903).

Alexander III., son of Alexander II., was born 10th March 1845, and married Dagmar, daughter of Christian IX. of Denmark, 1866. After his father's death, through fear of assassination he shut himself up in his palace at Gatschina. His coronation was postponed till 1883, and was celebrated with extraordinary magnificence, and with national festivities lasting several days. Through the fall of Merv, the subjugation of the Turkomans in Central Asia was completed. In 1885 hostilities with Britain, with regard to the defining of the frontier between the Russian territories and Afghanistan (q.v.), for a time seemed imminent. As regards European affairs, he broke away from the triple alliance between, Russia, Germany, and Austria, and looked rather to France. He was aggrieved by the new Bulgarian spirit. His home policy was reactionary, though strong efforts were made to prevent malversation by officials, and stern economies were practised. The liberties of the Baltic provinces and of Finland were curtailed, the Jews were oppressed, and old Russian orthodoxy

was favoured. Several Nihilist attempts were made on his life, and he kept himself practically a prisoner in his palace. He died at Livadia, 1st November 1894. See RUSSIA, BULGARIA, and a Life by Lowe (1894).

Alexander VI. is infamous amongst popes (See POPE). His most conspicuous qualities were a cunning and insidious cruelty, united with great fearlessness in danger, an unwearied perseverance and vigilance in all his undertakings, a soft and plausible manner towards his inferiors, a harsh and grasping spirit towards the rich. In spite of his talents and his love of art and science, he disdained, throughout his dissolute career, no means of gratifying his lust—not even perjury, murder, poisoning. He was born in Spain, at Jativa in Valencia, 1431. His real name was Rodrigo Lançol or Lenzuoli, but he assumed the ancient and famous one of his mother's family, Borgia. The beautiful Rosa Vanozza de Cattanei bore him five children, two of whom, Cesare and Lucrezia, equalled himself in notoriety (see BORGIA). In 1455 he was made a cardinal by his uncle, Calixtus III., and in 1492, on the death of Innocent VIII., was elevated to the papal chair, which he had previously secured by flagrant bribery. The long absence of the popes from Italy had weakened their authority and curtailed their revenues. To compensate for this loss, Alexander endeavoured to break the power of the Italian princes, and to appropriate their possessions for the benefit of his own family. He employed the most execrable means to gain this end. He died in 1503, most likely of fever, but according to popular tradition, through having accidentally partaken of poisoned wine, intended for ten cardinals, his guests. He apportioned the New World between Spain and Portugal; whilst under his pontificate the censorship of books was introduced, and Savonarola, the earnest and eloquent Florentine priest, who had advocated his deposition, was condemned to be burnt as a heretic. The researches of Von Reumont and Gregorovius have cleared his memory from some at least of the most odious charges; and there can be no question that many of the crimes ascribed to him were the direct or indirect work of Cesare Borgia. See Creighton's *History of the Papacy*, vols. ii. and iii. (1887), and Life by Mathew (1912).

Alexander OF BATTENBERG, Prince of Bulgaria. See BULGARIA.

Alexander OF HALES, the 'Irrefragable Doctor,' was originally an ecclesiastic in Gloucestershire, but having repaired to the schools of Paris, and become a noted professor of philosophy and theology, he suddenly, in 1222, entered the order of the Franciscans. He continued to lecture, however, till seven years before his death, in 1245. His chief and only authentic work is the ponderous *Summa Universa Theologiæ* (best ed., Venice, 1576, 4 vols.), written at the command of Pope Innocent IV., and enjoined by his successor, Alexander IV., to be used by all professors and students of theology in Christendom. Alexander gave the doctrines of the church a more rigorously syllogistic form than they had previously had, and may thus be considered as the author of the scholastic theology. Instead of appealing to tradition and authority, he deduces with great subtlety, from assumed premises, the most startling doctrines of Catholicism, especially in favour of the prerogatives of the papacy. He refuses any toleration to heretics, and would have them deprived of all property; he absolves subjects from all obligation to obey a prince that is not obedient to the church. The spiritual power, which blesses and consecrates kings, is, by that very fact, above all temporal powers, to say nothing of the essential dignity of its nature. It has the right to appoint and to judge these powers, while the pope has no judge but God. In ecclesiastical affairs, also, he maintains the pope's authority to be full, absolute, and superior to all laws and customs.

Alexander, ARCHIBALD, an American divine of Scottish descent, was born in Virginia, 17th April 1772, and died at Princeton, New Jersey, 22d October 1851. He studied theology, and performed itinerant missionary work in various parts of Virginia; became president of Hampden Sidney College in 1796, and pastor of a Presbyterian church in Philadelphia in 1807. On the establishment of Princeton College, he was appointed its first theological professor in 1812, which position he held till his death. Amongst other works, he published *Outlines of the Evidences of Christianity; Treatise on the Canon of the Scriptures* (1826); *History of the Patriarchs* (1833); and *History of the Israelitish Nation* (1852); his *Moral Science* was posthumous.—His eldest son, JAMES WADDELL ALEXANDER (1804–59), was a Presbyterian minister in Virginia, New Jersey, and at New York; and afterwards professor in Princeton Theological Seminary. He contributed to the *Princeton Review*, wrote over thirty children's books, a life of his father, and miscellaneous works. See his Life by Dr Hall (1860).—JOSEPH ADDISON ALEXANDER, third son (1809–60), graduated at Princeton in 1826, lectured there on Biblical Criticism and Ecclesiastical History, and for the last eight years of his life filled the chair of Biblical and Ecclesiastical History. He was engaged at the time of his death, along with Dr Hodge, on a commentary of the New Testament. He is best known by his commentaries and *Prophecies of Isaiah* (1846–7; revised edition, 1864), and the *Psalms Translated and Explained* (3 vols. 1850).

Alexander, SIR W. See STIRLING (EARL OF).

Alexander, WILLIAM, Bishop of Derry and Raphoe from 1867, and Archbishop of Armagh and Primate of all Ireland, 1896–1910, was born at Londonderry, 13th April 1824, and educated at Oxford. He died 12th September 1911. An eloquent preacher, he perhaps put his best work into the volume of poems named (1886) from *Augustine's Holiday*, in the 1900 edition from *The Finding of the Book*. See Life by his daughter (1913). He married in 1850 Cecil Frances Humphreys (1818–95), writer of graceful poetry, sacred and for children—her best-known hymns or poems being 'Jesus calls us o'er the tumult,' 'There is a green hill far away,' and 'The Burial of Moses.'

Alexander, WILLIAM LINDSAY (1808–84), Scottish Congregational divine, born at Leith, educated at Edinburgh, Glasgow, and St Andrews, removed in 1835 from a charge in Liverpool to Edinburgh, where he was pastor and principal of the Congregational College. See Life by Ross (1887).

Alexander Nevski, a Russian hero and saint, born in 1218 A.D., was the son of the Grand-duke Jaroslav, of Novgorod, who was forced to submit to the Mongol dominion in 1238. Alexander received the surname of Nevski on account of the splendid victory over the Swedes, which he achieved in 1240, on the Neva, near where St Petersburg now stands. At the death of his father in 1247, he became his successor, and opposed a papal attempt to reunite the Greek and Roman churches. To the end of his life he remained a vassal of the Tatars or Mongols, but knew how to moderate their tyranny. He was a good prince; and when he died in 1263, the gratitude of the nation canonised him. Peter the Great honoured his memory by building a magnificent convent on the spot where Alexander had fought his great

battle, and by founding the knightly order of Alexander Nevski.

Alexander Seve'rus, a Roman emperor, born in 205 A.D., was the cousin and adopted son of Heliogabalus, whom he succeeded in 222. The excellent education which he received from his mother, Julia Mamæa, rendered him one of the best princes in an age when virtue in a monarch was reckoned more dangerous than vice. He sought the society of the learned; Paulus and Ulpianus were his counsellors; Plato and Cicero were, next to Horace and Virgil, his favourite authors. Although a pagan, he reverenced the doctrines of Christianity, and often quoted that saying: 'Whatsoever ye would that men should do to you, do ye even so to them.' Beloved as he was by the citizens on account of his equity, he soon became an object of hatred to the unruly prætorian guards. His first expedition (231–33), against Artaxerxes, king of Persia, was happily terminated by a speedy overthrow of the enemy. But during one which he undertook in 234 against the Germans on the Rhine, to defend the frontiers of the empire from their incursions, an insurrection broke out among his troops, headed by Maximinus, in which Alexander was murdered, along with his mother, not far from Mainz (235).

Alexanders (*Smyrnium olusatrum*), a biennial plant of the natural order Umbelliferæ (q.v.), found in waste ground, near ruins, &c. in Britain and the south of Europe. The plant has an aromatic taste, strong and pungent, but becomes rather pleasant when blanched, and was formerly much cultivated and used in the same way as celery, although at present it is little regarded. The frequency of its occurrence near ruins in Britain, may probably be referred to its former cultivation. The fruit is carminative.—*S. perfoliatum*, a native of Italy, is used in the same way.—Another umbelliferous genus (*Zizia*) is popularly called Golden Alexanders in North America.

Alexandra. See EDWARD VII.

Alexandra Land, the westernmost islands of Franz Josef Land (q.v.); also an old name for the Northern Territory of Australia.

Alexandra Park, a public recreation ground (1863) for north London, 6 miles N. of Charing Cross.

Alexandretta. See SCANDEROON.

Alexandri, or ALECSANDRI, VASILIO, Rumanian poet and patriot, was born at Jassy in 1821. Educated at Paris, he returned to Jassy in 1839, and attached himself to a party of young men, who, influenced by Western ideas, were at once ambitious of literary distinction, and zealous for political equality and for Rumanian nationality. His share in the abortive revolution of 1848 obliged him for a time to take refuge in Paris, but he then and always laboured incessantly through the press and otherwise for Rumanian independence. He was foreign minister under Ghika in 1859–60. His first volume of verse appeared in 1852; his complete works including dramas, in 1873–76. He died 4th September 1890.

Alexandria was founded by Alexander the Great in the autumn of the year 332 B.C. It was situated originally on the low tract of land which separates the lake Mareotis from the Mediterranean, about 14 miles west of the Canopic mouth of the Nile. Before the city, in the Mediterranean, lay an island, upon the NE. point of which stood the famous lighthouse, the Pharos, built in the time of Ptolemy I. in the 3d century B.C., and said to have been 113 metres high. The island was connected with the mainland by a mole, called the Heptastadium, thus forming the two harbours. The plan of Alexandria was designed by the architect Deinocrates, and its original extent is said to have been about 4 miles in length, with a circumference of 15 miles. It was intersected by two straight main streets, crossing each other at right angles in a large square, and adorned with handsome houses, temples, and public buildings. The most magnificent quarter of the city was that called the Brucheion, which ran from the centre to the eastern harbour. This quarter of the city contained the palaces of the Ptolemies, the Museum, for centuries the focus of the intellectual life of the world, and the famous library; the mausoleum of Alexander the Great and of the Ptolemies, the temple of Poseidon, and the great theatre. To the south was the beautiful gymnasium. The Serapeum, or temple of Serapis, stood in the western division of the city, which formed the Egyptian quarter, and was called Rhacōtis; a small town of that name had occupied the site before the foundation of Alexandria. To the west of the city lay the great Necropolis, and to the east the race-course and suburb of Nicopolis. Much of the space under the houses was occupied by vaulted subterranean cisterns, which were capable of containing a sufficient quantity of water to supply the whole population of the city for a year. From the time of its foundation, Alexandria was the Greek capital of Egypt. Its population, in the time of its prosperity, is said by Diodorus to have amounted to about 300,000 free citizens, and probably a larger number of slaves. This population consisted mostly of Greeks, Jews, and Egyptians, together with settlers from all nations of the known world. After the death of Alexander the Great, Alexandria became the residence of the Ptolemies. They made it, next to Rome and Antioch, the most magnificent city of antiquity, as well as the chief seat of Greek learning and literature, which spread hence over the greater part of the ancient world. The situation of the city, at the point of junction between the East and West, rendered it the centre of the commerce of the world, and raised it to the highest degree of prosperity.

Alexandria had reached its greatest splendour when, on the death of Cleopatra, the last of the Ptolemies, in 30 B.C. it came into the possession of the Romans. Its glory was long unaffected, and it was the emporium of the world's commerce, especially for corn. In the reign of Caracalla, however, it suffered severely; and the rise of Constantinople promoted the decay of Alexandria. Christianity was introduced, according to tradition, by St Mark. In the 2d century its adherents were very numerous; amongst its teachers were Clemens Alexandrinus and Origen. The strife between Christianity and heathenism—powerfully described in Kingsley's *Hypatia*—gave rise to bloody contests in Alexandria. The Serapeum, the last seat of heathen theology and learning, was stormed by the Christians in 391 A.D., and converted into a Christian church. Alexandria was a chief seat of Christian theology till it was taken by the Arabs, under Amru, in 641, at which time it was much injured. The choice of Cairo as capital of the Egyptian khalifs hastened the now rapid decay of the city; the discovery of America, and of the passage to India by the Cape of Good Hope, very much diminished its trade; and when, in 1517, the Turks took the place, the remains of its former splendour wholly vanished, walls and buildings being reduced to ruins. In 1778 Alexandria contained no more than 6000 inhabitants. Under Mehemet Ali, however, the tide turned, and the city recovered rapidly. It is now again one of the most important commercial places on the Mediterranean. The Suez Canal diverted part of its trade as the centre of steam communication with India; but this was more

than compensated by the general impetus given by the canal to Egyptian prosperity. In 1882, during the rising of Arabi Pasha, serious damage was done to the city. The Europeans were maltreated; and as Arabi would not desist from strengthening the fortifications, a British fleet, in the interests of the khedive, bombarded the forts of Alexandria for over ten hours, July 11. On the two following days the town was sacked and plundered by the soldiery and populace, and great part of it destroyed by fire. A British force occupied it on the 14th.

The present city (called *Skanderi'eh* by the Arabs) is not situated exactly on the site of the old one, but is chiefly built on the mole, which has been increased by alluvial deposits till it has become a broad neck of land between the two harbours. The city is a strange mixture of East and West, old and new. The native town contains poor houses and wretched huts. The ever-increasing Frankish quarters have quite a European appearance, and swarm with cafés, shops, theatres, and the like. The chief square bears Mehemet Ali's name. Ramleh is a fashionable eastern suburb by the sea. The palace of Ras-el-Tin is the king's summer residence. The castle stands near the old Pharos, and the modern lighthouse has a revolving light, visible at a distance of 20 miles. Improvements have made the old harbour—the western one—one of the best and most spacious on the Mediterranean. The exposed eastern harbour or New Port has also been improved by the construction of an esplanade and breakwaters. There is railway communication with Cairo and Suez; the Mahmudia Canal, made by Mehemet Ali, connects Alexandria with the Nile. Pop. (1840) 60,000; (1882) 227,064; (1907) 332,246 (86,000 foreigners); (1917) 444,617. The value of exports (mainly cotton, cotton-seed, lentils, oilseed, hemp, drugs) reached in the early years of the 20th century over £30,000,000 a year (two-thirds going to Britain); of imports, over £23,000,000 (two-fifths from Britain). Of objects of antiquity the most prominent is Pompey's Pillar (q.v.). The so-called Cleopatra's Needles (see OBELISK) long stood here. A funerary hypogeum was discovered in 1900 at the ancient stadium Kom-el-Shougafa. The Græco-Roman Museum has great archæological interest. Near the town are catacombs and the recently unearthed ruins of the city of St Menas. The climate of Alexandria does not correspond with what is true of Egypt generally. In winter it rains almost daily; in summer the heat is moderated by sea-breezes.

ALEXANDRIAN CODEX, an important manuscript of the sacred Scriptures in Greek, now in the British Museum. It is written on parchment, in finely formed uncial letters, and is without accents, marks of aspiration, or spaces between the words. Its probable date is the middle of the 5th century. With the exception of a few gaps, it contains the whole Bible in Greek (the Old Testament being in the translation of the Septuagint), along with the epistles of Clemens Romanus, of whose genuine epistle to the Corinthians it is the only manuscript extant. For purposes of biblical criticism, the text of the Epistles of the New Testament is the most valuable part. This celebrated manuscript belonged, as early as 1098, to the library of the patriarch of Alexandria. In 1628 it was sent as a present to Charles I. of England by Cyrillus Lucaris, patriarch of Constantinople, who declared that he had got it from Alexandria, where he had held the same office; and that it was written there appears from internal and external evidence. Fac-similes have been published, of the New Testament, by Woide (Lond. 1786), and by Cowper (Lond. 1860); of the Old Testament, by Baber (Lond. 1816–28).

ALEXANDRIAN LIBRARY.—This remarkable collection of books, the largest of the ancient world, was founded by the first Ptolemy, and fostered by his son. It quickly grew, and already in the time of the first Ptolemy, Demetrius Phalereus had 50,000 volumes or rolls under his care. During its most flourishing period, under the direction of Zenodotus, Aristarchus of Byzantium, Callimachus, Apollonius Rhodius, and others, it is said to have contained 490,000, or, according to another authority, including all duplicates, as many as 700,000 volumes. The greater part of this Library, which embraced the collected literature of Rome, Greece, India, and Egypt, was contained in the famous Museum, in the quarter of Alexandria called the Brucheion. That during the siege of Alexandria by Julius Cæsar this part of the Library was destroyed by fire was a legend long believed to be historical; it is conjectured that a store of books for export was burned. The other part of the Library was kept in the Serapeum, the temple of Jupiter Serapis, where it remained till the time of Theodosius the Great. When this emperor permitted all the heathen temples in the Roman empire to be destroyed, the magnificent temple of Jupiter Serapis was not spared. A mob of fanatic Christians, led on by the Archbishop Theophilus, stormed and destroyed the temple, together, it is most likely, with the greater part of its literary treasures, in 391 A.D. It was at this time that the destruction of the Library was begun, and not at the taking of Alexandria by the Arabs, for the Khalif Omar, in 641, to which time its destruction is commonly assigned. A ridiculous, although ancient story, tells that the Arabs found a sufficient number of books remaining to heat the baths of the city for six months. The historian Orosius, who visited the place after the destruction of the temple by the Christians, relates that he then saw only the empty shelves of the Library. See Ritschl, *Die Alexandrinischen Bibliotheken*, in *Opuscula* (1866), and Weniger, *Das Alexandrinische Museum* (1875).

ALEXANDRIAN SCHOOL. — After liberty and intellectual cultivation had declined in Greece, Alexandria in Egypt became the home and centre of science and literature. The time in which it held this position may be divided into two periods; the first including the reigns of the Ptolemies, from 323 to 30 B.C.; the second, from 30 B.C. to 640 A.D. or from the fall of the Ptolemæan dynasty to the irruption of the Arabs. During the first period the intellectual activity at Alexandria was mainly of a purely literary or scientific kind; but during the second, partly from Jewish and Christian influences, it developed into the speculative philosophy of the Neo-Platonists and the religious philosophy of the Gnostics.

Ptolemy Soter, the first ruler who introduced and patronised Greek science and literature in Alexandria, was followed by that yet more munificent patron, Ptolemæus Philadelphus, who regularly established the celebrated Alexandrian Library and Museum, which had been begun by his father. This Museum was somewhat like a modern university, and within its walls learned scholars both lived and taught. The loss of Greek freedom soon took from Greek thought much of its boldness and originality, but thinkers found substitutes for these in learned research and criticism. They studied grammar, prosody, mythology, astronomy, and medicine, and unfolded their information in long didactic poems in epic form, full of learning, and marked by perfect mastery of verse, but often dull to a degree, and marred by numerous obscure and recondite allusions. Examples of these are the *Argonautica* of Apollonius Rhodius, and the

Alexandra or *Cassandra* of Lycophron. Other writers of epics were Euphorion, Nicander of Colophon, Dionysius, Dicæarchus, Rhianus, and Oppianus. Many poets employed lyric and elegiac forms for subjects completely unsuited for poetic treatment, which are yet happily expressed in verse. The earliest of the elegiac poets was Philetas of Cos; the greatest, perhaps, Callimachus. Among the lyric poets were Phanocles, Hermesianax, Alexander of Ætolia, and Lycophron. Epigrams and dramas were also written; but of the latter scarce anything has survived beyond the names of the seven tragedians called the Alexandrian Pleiades. Out of the Amœbean verse or bucolic mime—a rudimentary kind of drama—grew the best product of Alexandrian poetry, the Idylls of Theocritus. Still more active than the poets were the grammarians, to whom it is mainly due that we now possess the masterpieces of Greek literature at all. They were both philologists and *littérateurs*, who explained things as well as words, and were thus a kind of encyclopædists. Among these the greatest were Zenodotus of Ephesus, Aristophanes of Byzantium, and Aristarchus of Samothrace; only less eminent critics were Alexander of Ætolia, Lycophron, Callimachus, and Eratosthenes. Their chief service consists in having collected the writings then existing, prepared corrected texts, and preserved them for future generations.

The Alexandrian school has a spirit and character altogether different from the previous intellectual life of Greece. From the attention paid to the study of language, it was natural that correctness, purity, and elegance of expression should be especially cultivated; and in these respects many of its writers are distinguished. But what no study and no effort could give—the spirit that animated the earlier Greek poetry—was in most of these works wanting. In place of it, there was displayed greater art in composition; what had formerly been done by genius, was now to be done by the rules furnished by criticism. Where imitation and rule thus took the place of inspiration, each generation of disciples became more artificial and lifeless than their masters, until ultimately criticism degenerated into frivolous fault-finding, and both prose and poetry became laboured affectation. Still, for about four centuries, the Alexandrian school was the centre of learning and science in the ancient world. Counting from its origin to its complete extinction, it lasted a thousand years. The influence of the Alexandrian school upon Latin literature in the Augustan age must not be forgotten. We find it in all the contemporary poets, notably in Virgil, the greatest poet of the group.

The ALEXANDRIAN PHILOSOPHY is characterised by a blending of the philosophies of the East and of the West, and by a general tendency to *eclecticism*, as it is called, or an endeavour to reconcile conflicting systems of speculation, by bringing together what seemed true in each. The most famous representatives of this school were the Neo-Platonists (q.v.). Uniting the religious notions of the East with Greek dialectics, they represent the struggle of ancient civilisation with Christianity; and thus their system was not without influence on the form that Christian dogmas took in Egypt. The amalgamation of Eastern ideas with Christian gave rise to the system of the Gnostics (see GNOSTICISM), elaborated chiefly in Alexandria. See Bigg's *Christian Platonists of Alexandria* (Bampton Lectures, 1886); and the articles PHILO JUDÆUS, CLEMENS ALEXANDRINUS, ORIGEN.—The Alexandrian school was no less distinguished for the culture of the mathematical and physical sciences, which here reached a greater height than anywhere else in ancient times. Its mathematical school was founded in the reign of the first Ptolemy by the famous Euclid. Among its chief ornaments were Eratosthenes, who wrote well on almost all branches of human knowledge. His works on chronology are still valuable, and he was the first to attempt the measurement of the earth. Another was Apollonius of Perga, 'the great geometer,' author of a work on conic sections. The astronomers were distinguished from all their predecessors by their setting aside all metaphysical speculation, and devoting themselves to strict observation. Perhaps the greatest was Hipparchus, the true father of astronomy, to whom Claudius Ptolemy owed the substance of his famous work, the *Almagest*.

Alexandria, a town of Dumbartonshire, on the west bank of the Leven, opposite Bonhill, 3 miles N. of Dumbarton. It has grown from a mere 'clachan' to a thriving town, such growth being due to the neighbouring cotton-printing, bleaching, and Turkey-red dye-works, established since 1768. Pop. 6000.

Alexandria, a port of entry on the right or Virginian bank of the Potomac, U.S., 7 miles below Washington, on the opposite side of the river, with which it is connected by rail. Though Alexandria is fully 100 miles from the entrance of the Potomac into Chesapeake Bay, yet the stream in front of it, which forms its harbour, is still a mile wide. The place is accessible from the sea to the largest vessels, and has ample railway accommodation; the Chesapeake and Ohio canal begins here. There are some cotton manufactures. In Old Christ Church Washington's pew is still pointed out. Pop. 18,000.

Alexandrina, LAKE. See MURRAY RIVER.

Alexandrines are rhyming verses consisting each of twelve syllables or six measures. The name is most probably derived from an old French poem on Alexander the Great, composed between 1180 and 1190, in which this measure was first used; according to others, it was so called from the name of one of its authors, Alexander de Bernay. The Alexandrine has become the regular epic or heroic verse of the French, among whom each line is divided in the middle into two hemistichs, the sixth syllable always ending a word. In English, this rule is not always observed, as in the following verse:

> That all the woods shall an | swer, and their echoes ring.

The only considerable English poem wholly written in Alexandrines is Drayton's *Polyolbion;* but the Spenserian stanza regularly ends in an Alexandrine, and the measure occurs occasionally in our common heroic verse of five feet, as the last line of a couplet:

> When both are full, they feed our blest abode,
> Like those that watered once | the paradise of God.—DRYDEN.

Pope's lines in the *Essay on Criticism* are familiar:

> A needless Alexandrine ends the song,
> That, like a wounded snake, drags its slow length along.

In spite of this, Pope introduced Alexandrines at the close of his *Messiah* and elsewhere, though his later poems contain very few examples. According to Dr Johnson, 'Cowley was the first poet that mingled Alexandrines at pleasure with the common heroic of ten syllables; and from him Dryden borrowed the practice, whether ornamental or licentious.'

Alexandropol (formerly *Gumri*), an important fortress and the largest town in the Erivan district of Armenia, on a treeless plateau on the road from Erivan to Kars, has accommodation for a garrison of 10,000 men. The stronghold gave the Russians complete command of the head-waters of the Euphrates; the place, the scene of much fighting, was theirs from 1853. The silk trade is actively carried on. Pop. 50,000.

Alexandrovsk, a small town of Ukraine, on the left bank of the Dnieper, 202 miles N. of Simferopol by rail; pop. 20,000. See also KOLA.

Alexei, or ALEXIS, called MIKHAILOVICH, the second Russian tsar of the House of Romanov, was born in 1629, and succeeded his father, Michael, in 1645. An insurrection disturbed his reign in 1648, and popular discontent favoured the plans of two pretenders to the throne. In his two campaigns against the Poles (1654–67) he took Smolensk, conquered and devastated almost the whole of Lithuania, and secured for himself the possession of several provinces. He also gained a part of the Ukraine; but his war with Sweden (1656–58) was unfortunate. Alexei introduced various important reforms into the Russian laws, and ventured on some ecclesiastical changes which produced serious dissensions. He died in 1676. By his second wife he was the father of Peter the Great.

Alexei, called PETRO'VICH, the eldest son of Peter the Great of Russia, was born at Moscow in 1690. Opposed to Peter's innovations, he was excluded from the succession to the throne, but escaped to Vienna, and thence went to Naples. He was induced to return to Russia, and soon after the accomplices of his flight were punished with merciless severity. In 1718 Alexei himself was placed on trial and condemned to death, but two days later died, as was probably intended, from the effects of his examination under torture. Other accounts assert that he was beheaded in prison. His son, as Peter II., was elevated to the throne.

Alexeiev, MIKHAIL VASILEVICH (1857–1918), Russian general, son of a private soldier, served in the Russo-Turkish war and (as Quarter-master-general of the Third Army) in the Russo-Japanese war, and lectured on strategy. In the Great War (q.v.) as Chief of Staff he directed the offensive in Galicia and the retreat from Warsaw. Virtually Commander-in-chief under Kerensky, he mediated in the Kornilov affair, then resigned, and taking up arms against the Bolsheviks, was defeated, and died of pneumonia.

Alexinatz, a town of Serbia, on the Moravitza, 134 miles SSE. of Belgrade by rail. In 1876 it suffered severely on its capture by the Turks; and near it is a memorial (1880) to the Russians who fell there. Much tobacco is raised in the neighbourhood. Pop. 10,000.

Alexius Comne'nus (1048–1118), one of the ablest rulers of the Byzantine empire, was born at Constantinople. He was the nephew of the Emperor Isaac Comnenus, on whose abdication, in 1059, Alexius's father refused the purple. Alexius, having in youth given brilliant promise of military genius, was at length, in 1081, after four brief anarchic reigns, elevated by his soldiers to the throne. Gibbon graphically paints his position and achievements. Everywhere he was encompassed with foes. The Scythians and Turks were pouring down from the north and north-east; the fierce Normans, who had effected a lodgment in Sicily and Italy, were menacing his western provinces; and, in 1096, the myriad warriors of the first crusade burst into his empire on their way to Palestine, and encamped around the gates of his capital. Yet he contrived to avoid all perils by the wisdom of his policy, the mingled patience and promptitude of his character, his discipline in the camp, and his humanity on the throne. He reigned for thirty-seven years; and had it been possible to preserve the weak and corrupt Byzantine empire in its integrity, a ruler like Alexius might have achieved the task. He could only delay the inevitable doom. Historians differ as to the sincerity of his conduct towards the crusaders. His daughter Anna Comnena, who wrote his life, defends his 'policy' with filial piety; but it seems clear that he entertained a profound dread and suspicion of the half-civilised Franks, and, knowing the weakness of his own empire, was compelled to dissimulate.

Alfa, also spelt *Halfa*, is one of the varieties of Esparto (q.v.).—ALFALFA is the Spanish and Spanish-American name for Lucerne (q.v.).

Alfarabi, an Eastern philosopher, born at Farab, across the Oxus. After studying at Bagdad, he travelled widely, and, on finally settling at Damascus, he was received with honour by the khalif, who assigned him a pension, which he enjoyed till his death in 950. He led a life retired and temperate, almost ascetic. The subjects of his voluminous writings embrace almost every known science; but he is most worthy of remembrance for his work in the compilation of an Encyclopædia, the MS. of which is in the library of the Escurial.

Alfie'ri, VITTORIO, COUNT, one of the most famous of modern Italian poets, was born at Asti, in Piedmont, on the 17th January 1749. His education was very defective, but at fourteen he found himself master of a vast fortune. The chief interest of his youth was a passionate love for horses, which he retained through life. The years 1767–72 he spent in travelling through the greater part of Europe, after which he returned to Turin, and devoted himself to literary pursuits, renouncing idleness and unworthy amours. The applause which his first attempts received, encouraged him in his determination to win fame as a dramatic author. But as he clearly saw the deficiencies of his education, he began at a mature age to learn Latin, and also to study the Tuscan dialect, for which purpose he went to Tuscany. In Florence (1777) Alfieri made the acquaintance of the Countess of Albany, wife of the Pretender, Charles Edward Stuart. He became deeply attached to her, and in this—the one persistent love of his life—he found the impulse that his vacillating nature needed. To render himself worthy of her esteem, he strove with unremitting earnestness after poetic excellence; and in order to be perfectly free and independent of all other cares, he transferred his whole property to his sister, in exchange for an annuity which was hardly half his former income. He now lived alternately in Florence and in Rome, latterly with the Countess; and after the death of her unworthy husband, they lived together in Alsace or in Paris, until the Revolution drove them first to England, and next to Florence. Here Alfieri died, on the 8th October 1803. Their ashes repose in the church of Santa Croce, in Florence, under a beautiful monument by Canova, between the tombs of Michelangelo and Machiavelli. Alfieri published twenty-one tragedies, six comedies, and one 'tramelogedia'—a name invented by himself. These show a want of fresh imaginative vigour, and betray the laborious perseverance with which their author did violence both to himself and to art. He was inspired more by politics than by poetry. He wished to breathe a spirit of freedom into the dormant minds of his countrymen, and considered the theatre as a school in which the people might learn to be 'free, strong, and noble.' In order to preserve the purity of his muse, Alfieri had resolved to read no other Italian poet. He wished to produce an effect by the very simplest means, and, renouncing the aid of ornament, to please by manly strength and earnestness alone. His works are on this account cold and stiff, his plots simple even to poverty, his verse hard and unpleasing, and his language destitute of that magic splendour of colouring which stirs the inmost soul. In spite of this, Alfieri did good service to

Italian tragedy. He corrected the effeminate taste which had before prevailed, as well as the pedantry of an affected imitation of Attic models. Succeeding writers endeavoured to imitate his strength and simplicity. His comedies are less successful than his tragedies. They manifest the same serious political tendency; the invention is poor, the development of the plot uninteresting, and the characters are only general sketches, without individuality. The most successful of his dramatic works is his 'tramelogedia' *Abele*, a mixture of tragedy and opera. Besides his dramatic works, he left an epic poem in four cantos, an autobiography, also many lyrical poems, sixteen satires, and poetical translations of Terence, Virgil, and portions of Æschylus, Sophocles, Euripides, and Aristophanes.

Vaughan in *Types of Tragic Drama* (1908) praises him for having under austerely classical form secured in his tragedies a rare intensity of action and passion, and characters drawn with subtlety and vividness. See also Vernon Lee's *Countess of Albany* (1884).

Alfonso III., surnamed THE GREAT, king of Leon, Asturias, and Galicia, succeeded his father, Ordoño, in 866. After reducing to obedience his jealous and factious nobles, he turned his arms against other enemies, fought through more than thirty campaigns and gained numerous victories over the Moors, occupied Coimbra, and extended his territory as far as Portugal and Old Castile. But these constant wars entailed great expense and misery on his subjects, and resulted, in 888, in a popular rising, at the head of which was Alfonso's own son Garcias. But the active king quickly crushed the rebels, and threw his son into prison. A second conspiracy, instigated by the queen, was more successful, and Alfonso was obliged to abdicate the throne, and divide his territory among his three sons. But once again the old hero was called upon to save his country, and lead its armies against the invading Moors. After returning in triumph, he died at Zamora, 910.

Alfonso X., surnamed 'the Astronomer,' 'the Philosopher,' or 'the Wise' (*El Sabio*), king of Leon and Castile, born 1226, succeeded his father, Ferdinand III., in 1252. Elected as their king by part of the German princes in 1257, he had to be content with the empty honour, nor was he more successful in his hereditary claim to Swabia through his mother Beatrix, daughter of Philip of Swabia. He was more successful in his wars with the Moors, and his victories over them enabled him to unite Murcia with Castile. In 1271 he was able to crush an insurrection headed by his son Philip; but a second and successful rising, under another son Sancho in 1282, deprived him of his throne. Two years later, he died a fugitive at Seville. Alfonso was the founder of a Castilian national literature. He caused the first general history of Spain to be composed in the Castilian tongue by his historians, as well as a translation of the Old Testament to be made into the vernacular by Toledo Jews. He completed the well-known code of laws, *Leyes de las Partidas*, which in 1501 became the universal law of the land; and he wrote several long poems, besides a work on chemistry, and another on philosophy. He sought to improve the Ptolemaic planetary tables, whose anomalies had struck observers even at that early time. For this purpose, he assembled at Toledo upwards of fifty of the most celebrated astronomers of that age. His improved planetary tables, still known as the *Alfonsine Tables*, were completed in 1252 at the cost of 40,000 ducats. The *Opusculos Legales* of Alfonso were published by the Royal Academy of Madrid in 1836.

Alfonso I. (*El Conquistador*, 'the Conqueror'), earliest king of Portugal, was the son of Henry of Burgundy, conqueror and first Count of Portugal. Born in 1110, he was but two years of age at his father's death, so that the management of affairs fell into the hands of his ambitious and dissolute mother, Theresa of Castile. Wresting the power from her in 1128, he turned his sword against Castile and the Moors, and defeated the latter, after a bloody struggle, at Ourique, July 25, 1139, proclaiming himself king of Portugal on the field of battle. The title was confirmed by the pope three years later. After settling the succession, the privileges of the nobility, and the administration of justice at the Cortes of Lamego, with the help of some casual English crusaders he took Lisbon (1147), and later, the whole of Galicia, Estremadura, and Elvas. He died at Coimbra, December 6, 1185.

Alfonso VI., king of Portugal, succeeded his father, John IV., in 1656, when but thirteen years of age. For some years the government was in the hands of his mother, Luise de Guzman, a woman of great wisdom and prudence; but in 1662 the sickly and dissolute prince dismissed his mother from her office, only to fall as completely into the hands of his minister, Count Castel-Melhor. Yet Portugal was victorious in the war against Spain, spite of the incapacity of king and minister, although for this she had to thank her English and French allies. In 1666 Alfonso married a princess of Savoy, but the queen was soon disgusted with her unworthy husband, and conspired with his brother Pedro against him. He was forced to surrender to the latter his crown, and to dissolve on his behalf what was a marriage merely in name. Alfonso died twelve years later (1683), a state prisoner at Cintra.

Alfonso V., king of Aragon and Navarre, but Alfonso I. of Naples and Sicily, 'the Magnanimous,' succeeded his father in 1416, when but 15 years old. Summoned to her help by Queen Joanna II. of Naples, he defeated her foes, Sforza and Louis of Anjou, but lost her favour by throwing into prison her minion Caraccioli. The fickle queen now declared his rival Louis her successor. At her death in 1435, Alfonso resolved to claim the kingdom, but found himself opposed by Duke René of Lorraine, whom Joanna had appointed her successor after the death of Louis. Rome and Genoa sided with René, and the Genoese fleet attacked and defeated that of Alfonso, the monarch himself being taken prisoner. He was sent to Duke Philip of Milan, who, charmed by his manner and talents, soon set him at liberty, and even formed an alliance with him. After a five-years' warfare, Alfonso was successful, and entered Naples in triumph, and was recognised as its king by the pope. He patronised letters and the arts, and governed with prudence and justice. He died at Naples in 1458, leaving his hereditary dominions to his brother John, and Naples to his own son Ferdinand, who was legitimised by the pope.

Alford, a village of Aberdeenshire, 30 miles NW. of Aberdeen. Here Montrose defeated the Covenanters under Baillie, 2d July 1645.

Alford, HENRY, born in London in 1810, studied at Trinity College, Cambridge, and in 1835–53 was vicar of Wymeswold, Leicestershire. His *Poems and Poetical Fragments* (1831) was followed by *The School of the Heart, and other Poems* (1835), *Chapters on the Greek Poets* (1841). In 1844–61 appeared in 4 vols. his *magnum opus*, the Greek Testament, with notes and various readings. From 1853 at Quebec Chapel, London, he maintained his reputation as a preacher, and in 1857 he was appointed Dean of Canterbury. *A Plea for the Queen's English* (1863) was one of his 48 volumes. He was the first editor (1866–70) of the *Contemporary Review*. Several of his hymns are widely

popular. He died January 12, 1871. See the Life by his widow (1873).

Alfred (or AELFRED), king of Wessex in 871–901, well deserves his cognomen of 'the Great,' though his kingdom was small, his military power barely enough for his needs, and his character eminent rather for manly strength, sagacity, and the kingly sense of responsibility than for military or literary genius. So revered was he by contemporaries and later ages that his actual achievements were overgrown by fable—such as the stories of his visiting the Danes' camp disguised as a harper, and of his neglecting the cakes of the cottager's wife. The translation of Bede's history was not his, though he probably had it made. His services to England and to English culture are noticed under ENGLAND and ENGLISH LITERATURE. Alfred was born at Wantage in 849. His father was Ethelwolf, son of Egbert, king of the West Saxons; and though the youngest of five sons, he succeeded to the crown, in 871, on the death of his brother Ethelred, at the age of 22. By that time the Danes had overrun most of England north of the Thames. The victory of Ashdown, won chiefly by the bravery of Alfred, before his accession to the throne, had given only a temporary check to their incursions into Wessex. In the year of his accession, the West Saxons fought nine battles against the Danes, with varying success. After that there was respite for several years, till, early in 878, Guthrum, king of the Danes of East Anglia, suddenly burst into Wessex with his savage host. Alfred could make no effectual resistance, and had to seek refuge in the marshes of Somersetshire. There he raised a fort at Athelney, and with a band of faithful followers maintained himself for several months. To this period belongs the well-known story of the burnt cakes. The West Saxons, however, were not subdued. In the same year (878), Alfred gathered his friends around him, and defeated the Danes at Edington, in Wiltshire. By the Peace of Wedmore, Guthrum was obliged to receive baptism, and to acknowledge the supremacy of Alfred, who retained for himself the country south of the Thames, and the greater part of Mercia, while ceding to the Danes East Anglia and the rest of Mercia. The wisdom of the arrangement is seen in the fact that Guthrum, on the whole, continued quiet and faithful to the treaty till his death.

Early in his reign, Alfred saw the necessity of meeting the Danes on their own element, the sea, and his success led him to establish an English navy. In 886 he recovered London, in 893 Northumbria made submission to him; and thus he became nominally king of all England. On the whole, Alfred enjoyed a much-needed period of peace, from the Peace of Wedmore (878) till 893, when a fresh swarm of Danes, under the leadership of Hasting, infested the country. They were supported by their fellow-countrymen in East Anglia and Northumbria, and gave much trouble. At last, in the course of their marching and ravaging, they sailed with their fleet up the Lea, where Alfred brought them to terms by diverting the river, and leaving their ships dry. After five years of struggle, peace was re-established.

As a leader, Alfred's great work thus consisted in repelling the invasion of the Danes, who at his accession threatened to subdue the whole country, and in helping towards the consolidation of England into a united monarchy. His work as a legislator is also important, though it is absolutely unhistorical to regard him as establishing trial by jury, as having divided England into counties and hundreds, or as the founder of the university of Oxford. As legislator, he simply compiled or collected the best among the enactments of earlier kings. The aim of all his work was practical, to promote the good of his people; and the writings for which he is celebrated bear the same character of sagacious usefulness.

Alfred died on the 27th of October 901, aged 52, leaving his country in the enjoyment of comparative peace and prosperity, the fruit of that wise and energetic rule which has made his memory dear to all generations of Englishmen, as that of their best and greatest king. We cannot perhaps realise the resolute patience of Alfred in his political and military capacity, for we have but a very imperfect knowledge of the obstacles which stood in his way; but it must excite both our highest wonder and reverence to behold a man pursuing solitarily, in the midst of ferocity, barbarism, and ignorance, and in spite of the perpetual pains with which his body was racked, so many various and noble schemes for the civilisation and true glory of his country. The principal writings of Alfred are his translations of Boethius' *Consolation of Philosophy*, of the Histories of Bede and Orosius, and of the *Pastoral Care* of Gregory the Great (the last edited by Sweet, 1871). By Layamon Alfred is called 'Engelondes deorling;' and Freeman declares, 'There is no other name to compare with his; he is the most perfect character in history.'

Asser (q.v.) and the chronicles are the old authorities. There are Lives by Pauli (trans. 1858), Hughes (1878), Lees (1919); and the millenary of his death produced numerous memorial works—by Oman, Earle, Pollock, and others (1899), Conybeare (1914), F. Harrison (1901), Sir W. Besant (1901). But by far the most authoritative is *Alfred's Life and Times*, by C. Plummer (1902).

Alfreton, an urban district of Derbyshire, 14 miles NNE. of Derby by rail, with manufactures of stockings; pop. 20,000.

Algæ. While the sea-weeds furnish the most familiar representatives of this great series of lower plants, many forms are abundant in fresh water, and even occur on *terra firma*. So great is the diversity of form which they present, that they must by no means be regarded (as was too long the case) as a 'mere natural order,' corresponding to those of higher plants, but rather as a vast and vague alliance comprehending many orders, and presenting all degrees of organisation, from the simple and almost undifferentiated cell, onwards through linear and plane cell-aggregates, to forms of almost arborescent complexity and often gigantic size. It is impossible, therefore, to indicate any set of common characters corresponding to those presented by higher groups: the real diagnosis must be rather a negative one. Dividing the vegetable kingdom into (a) *Cormophytes*, characterised by the possession of an ascending and descending axis, with appendages, and comprehending the higher cryptogams as well as the phanerogams; and (b) *Thallophytes*, destitute of stem and leaf—the latter are broadly distinguishable as Algæ, Fungi, and Lichens. The Lichens (q.v.) being analysed into a curiously interwoven web of mixed algal and fungal nature, the problem of discriminating algæ from fungi remains, and this has been the subject of no little research and controversy (see FUNGI). The essential fact, however, is, that in both groups there is exhibited a broadly parallel advance in morphological complexity, from unicellular and filamentous to higher forms, and similarly as respects the reproductive system. These correspondences are, moreover, sometimes so close as to leave little doubt of the origin of the fungal form from the corresponding algal one, by the simple disappearance of its chlorophyll, consequent on the assumption of parasitic or saprophytic life, just as is observed among phanerogams, such as dodder or toothwort. The presence or absence of chlorophyll becomes thus

the only almost constant distinction between fungi and algæ, and this break-down of the morphological barrier led Cohn, and subsequently Sachs and other botanists, to frame classifications in which the fungi and algæ were arranged together in a single ascending series, characterised by the degree of differentiation of the reproductive system. A summary of this mode of classification is thus worth noting, not only because it has been extensively employed in botanical manuals, &c., but because emphasising the importance of the degree of development of the reproductive system. (1) Reproduction asexual—PROTOPHYTA. (2) Reproduction by conjugation of similar cells to form a resting 'zygospore'—ZYGOSPOREÆ. (3) Reproductive cells distinctly differentiated as male and female; the fertilised female cell (ovum) giving rise to swarmspores or a new plant—OOSPOREÆ. (4) After fertilisation, a peculiar vegetative growth arises, within which the fertilised ovum may variously develop—CARPOSPOREÆ. The defects of such a classification, both in grouping quite unrelated forms and separating obviously kindred ones, have been long ago and fully pointed out, especially by De Bary; and for the present purpose it will be convenient to waive as far as possible the dogmatic treatment of the problem of classification, and above all things clearly to point out the general lines upon which all classifications are based, and the essential facts which these differ merely in variously accenting. A series of the most important and accessible of the simpler types of algæ must, in the first place, be briefly described.

Our concrete studies may therefore conveniently commence with such a simple and common form as the *Pleurococcus vulgaris*, to which the green

Fig. 1.—Life-history of Unicellular Plant (*Protococcus*): 1, encysted; 2, quitting its wall; 3, ciliated; 4, quiescent; 5 and 6, dividing.

covering of tree trunks, &c. is largely due. Here the organism is a simple Cell (q.v.), or nucleated mass of protoplasm, tinged green by chlorophyll, and covered by a cellulose wall. Multiplication by transverse division is, however, in active progress; twos and fours are thus formed, but soon separate as independent cells. Closely allied forms occur in water, and may be followed through a more complex life-history. Especially after a period of cold or drought, the remarkable process of 'rejuvenescence' may be observed: the protoplasm escapes through a rupture in the cell-wall, develops a couple of delicate contractile filaments or cilia, and thus enters an actively 'motile stage' of existence. After a time the resting phase is resumed, the cilia being withdrawn, and a cell-wall redeveloped.

Some such forms are known in the vegetative state alone, and where simply green, are termed *Palmellaceæ;* they frequently have gelatinous cell-walls. Many doubtfully allied types develop bluish or yellowish chlorophyll (phycocyan and phycoxanthin of spectroscopists; and are hence united under the common title of *Cyanophyceæ*). Some of these form jelly-like masses (*Glœocapsa, Nostoc*), others become filamentous; the constituent cells of the filament remaining similar to each other (*Oscillatoria*), or differentiating a larger cell, or 'heterocyst' of dubious function, generally at one end (*Rivularia*). The chlorophyll, too, may disappear altogether, and then we pass almost insensibly among the *Bacteria* or *Schizomycetes.* These lowest algæ, in which multiplication is by transverse division only, may therefore more con-

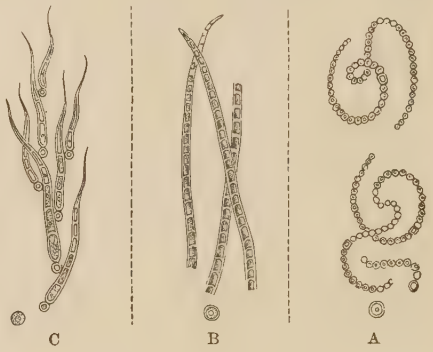


Fig. 2.
A, *Nostoc;* B, *Oscillatoria;* C, *Rivularia.*

veniently be discussed along with their more important congeners, the Bacteria (q.v.).

Returning to our primitive Protococcus-like form, we may readily imagine its multiplication by division to continue until not only four, but eight, sixteen, or more segments are formed. Let these segments, held together by a slightly more gelatinous cellulose envelope, pass into the motile phase, the result will be a ciliated sphere, of which the constituent cells may sometimes themselves re-segment before breaking up; more frequently, however, they separate, and may often be observed

Fig. 3.

A, Life-history of *Chlamydomonas,* showing encystment with division, liberated zoospores, conjugation of equal and of unequal zoospores; B, *Pandorina;* C, *Eudorina;* D, *Volvox.* (The arrows indicate the recommencement of the cycle by the resting spore or ovum.)

uniting or 'conjugating' in pairs to form a single cell, which, after a period of rest, divides and repeats the cycle anew. Such a form with eight segments is *Chlamydomonas;* with sixteen segments, *Pandorina.* Among such forms, a differentiation of the conjugating cells becomes increasingly obvious, until the primitively equal and similar 'zoospores' become distinctly larger and smaller—*macro-* and *microspore* respectively; we have, in short, the dawn of sex. Vegetative progress also continues; the segmentation mass may increase to thirty-two or sixty-four, and after a brief period of agitation, may settle into a beautifully stellate figure like *Pediastrum,* or may even continue dividing till

many thousand minute cells are formed, which, on settling, elongate, and apply themselves point to point, so as to form a network of loose meshes (*Hydrodictyon*). Macrospores and microspores are here well distinguished; we have still, however, to seek for the full differentiation of sex. This occurs in such a form as *Volvox*, where the segmentation mass forms a beautiful spherical layer of ciliated cells, connected by protoplasmic bridges, and embedded in a gelatinous matrix of undistinguishable cell-wall substance. After the vegetative growth has passed its climax, some cells begin to grow at the expense of others; of these, many become *ova*, while others, after a time, segment into tiny *spermatozoa* (for the familiar animal names of the essential sex-cells may be fairly applied). Fertilisation takes place in the usual way, and is followed by the segmentation of each ovum into a new colony.

But instead of the simple spherical segmentation of *Pandorina* or *Chlamydococcus*, which we may trace to the division in planes at right angles seen in *Protococcus* (fig. 1), we may have the successive planes of division remaining parallel. Such successive divisions in parallel planes will produce a filament, and, as we have seen above, we thus enter among a vast new series of forms. The simplest of

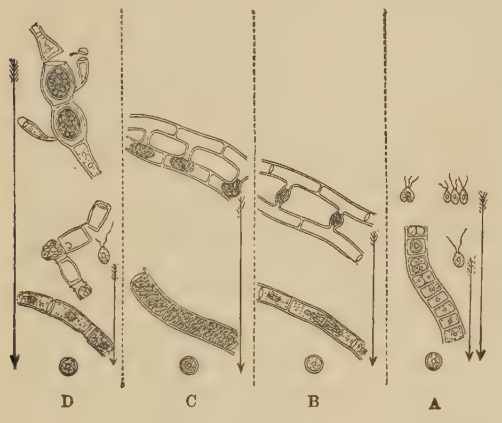


Fig. 4.

A, Life-history of *Ulothrix*; B, of *Mesocarpus*; C, *Spirogyra*; D, *Œdogonium*.

these, as already stated, merely vegetate indefinitely, with periods of repose, without showing any signs of conjugation or the sexual process. In many filamentous algæ the process of rejuvenescence occurs, and the zoospores may conjugate; in the lowest of which conjugating forms the zoospores are equal and similar, but the differentiation of macrospore and microspore soon arises (*Ulothrix*). Again, the motile phase may entirely disappear, and conjugation without rejuvenescence take place between the cells of parallel filaments: here, as formerly, equality and similarity may be perfect (*Mesocarpus*); or incipient sex may manifest itself (*Spirogyra*); finally, sex may become perfected (*Sphæroplea*). Yet a further specialisation is possible: the reproductive changes may be restricted to definite cells or portions of the filaments; and such a case is afforded by *Œdogonium*. This peculiar form is characterised, so far as its vegetative system is concerned, by the peculiar specialisation for the opening and the repair of that (in other forms irregular) rent of the cell-wall which is necessary for rejuvenescence. The reproductive system is, however, still more remarkable; many species are constantly dicœcious; the dwarfed male filaments grow on the larger female ones; spermatozoid and ovum respectively develop, with separation of portions recalling the sperm-cap and polar vesicle of animals, or the distinction of vegetative and reproductive nucleus demonstrated by Strasburger in the pollen grain (see OVUM).

The remarkable and varied *Desmideæ* and *Diatomaceæ*, so familiar to microscopists, though rarely filamentous, have been regarded, on account of their habit of conjugation, as allied to the *Mesocarpeæ*; but since they are on many grounds entitled to separate and fuller treatment, their structure and affinities need not here be discussed (see DESMIDS, DIATOMS).

Branching occurs at various points in this filamentous series, and this readily leads us to the formation of bi-dimensional (flat) cell-aggregates, such as the common green *Ulva* of every sea-shore. Here we start afresh with rejuvenescence by swarm-spores, capable of reproducing the parent plant without conjugation; in higher genera at least (*Enteromorpha*), conjugation occurs, and macrospore and microspore are distinguishable; while the change from a plane to a tubular arrangement of cells in *Enteromorpha* leads us to solid or tridimensional forms.

Before entering, however, on the study of these complex multicellular forms, we should return to note the unexhausted possibilities of unicellular differentiation. Hitherto we have examined different modes of cell-division, but we may imagine the necessity of this superseded by the continuous growth and regional differentiation of the primitive cell. Such a form is commonly presented us by the remarkable *Botrydium*, not uncommon in greenhouses (fig. 5, C). Here the cell elongates vertically, without division, into what is curiously analogous to the ascending and descending axis of a higher plant. The upper portion remains above ground, expands, and vegetates; the lower divides into colourless processes, which perform both the mechanical and absorptive functions of roots. Multiplication may take place by simple lateral gemmation, or by other methods, varying

Fig. 5.

A, *Caulerpa*; B, *Bryopsis*; C, *Botrydium*; D, *Vaucheria*.

widely with the conditions of the environment. In ordinary circumstances, when moisture is abundant, the protoplasmic contents simply break up into zoospores, which, on settling down with or without conjugation, reproduce the plant. Under the influence of drought and sun, the protoplasm descends into the root filaments, and there encysts itself, rejuvenescence by-and-by taking place as usual; while, on the approach of winter, the encystment takes place with the upper vegetative portion of the cell, which becomes gradually thickened. Another very interesting allied form is *Vaucheria*

(fig. 5, D). Here the cell lengthens into a filament, and distinct male and female organs differentiate from short lateral branches, true sexual fertilisation occurring. In some species, however, all the less differentiated modes of reproduction have been observed; thus in *Vaucheria sessilis*, a many-ciliated zoospore is formed, which is active for hours; in another (*V. sericea*), this is only active for a few minutes, and in *V. geminata* it never issues at all, but simply rejuvenesces without leaving its cell-wall, like a pollen grain; finally, the quiescent bud simply drops off (*V. tuberosa*), to germinate into a new filament. The marine types start with simple forms—*Valonia* recalling *Botrydium*, as *Codium* does *Vaucheria*—but assume a high degree of vegetative complexity, e.g. the branched *Bryopsis*, and at length the (multicellular) *Acetabularia*. With this increase of vegetative differentiation, the converse reproductive degeneration is beautifully illustrated. Thus the former still multiplies by zoospores which conjugate, but those of the latter simply rejuvenesce, and the plant is more frequently reproduced by vegetative buds; while in the enormously ramified and complex, but still unicellular *Caulerpa*, the mode of multiplication seems to be reduced to occasional gemmation from the relatively less vegetative root portion alone.

We have now surveyed the families of lower algæ, and have seen that the degree of differentiation of the reproductive process in the direction of definite sex runs broadly parallel, while the vegetative structure is much more widely differentiated. It is therefore rather by the latter that we must especially classify, and, without insisting on a too rigorous application of this principle, it is evident (1) that, as has long been increasingly obvious, the *Palmellaceæ* represent, or, at anyrate, include largely the vegetative states of higher forms; (2) that the *Protococcaceæ*, *Pandorineæ*, *Hydrodictyeæ*, and *Volvocineæ* form another natural series, characterised by their mode of cell-division and aggregation; (3) that the simple confervoid types lead to *Ulvaceæ* on one hand, and to *Chætophoraceæ*, *Ulothrichaceæ*, &c., on others, the *Conjugatæ* being also not very far remote; while (4) the *Siphoneæ*, despite the necessary parallelism of their reproductive evolution, represent an exceedingly distinct and lower type of structure, which separates them from all the algæ proper.

The brown seaweeds (*Phæophyceæ*, *Fucaceæ*) and the red seaweeds (*Florideæ*) are of much greater complexity, both vegetative and reproductive, than any of the preceding forms, and may conveniently receive separate treatment (see SEAWEEDS).

Algardi, ALESSANDRO, born at Bologna in 1602, ranks next to Bernini among Italian sculptors of the 17th century, and excelled especially in the representation of the nude. His works, however, suffered from a striving after picturesqueness, opposed to the simplicity of true sculpture. The most important is a colossal relievo, in St Peter's, of 'Pope Leo restraining Attila from marching on Rome.' Algardi died in 1654.

Algaroba. See CAROB.

Algarotti, FRANCESCO, an Italian author, was born at Venice in 1712, studied in Rome and Bologna, and in his twenty-first year visited Paris, where he published *Neutonianismo per le Donne* (1733), the basis of his subsequent reputation. Until 1739, he lived in France. On his return from a journey to Russia, Algarotti became acquainted with Frederick the Great, who in 1740 made him a count; in 1747, chamberlain. Patronised also by Augustus III. of Poland, he lived alternately in Berlin and Dresden until 1754, when he returned to Italy. He died March 3, 1764, at Pisa, where Frederick raised a monument to his memory. His repute as a connoisseur is confirmed by his *Saggi sopra le Belle Arti*, and by the paintings he selected for the Dresden Gallery. His poetry displays no great genius; but his letters rank with the best in the Italian language. There is a good edition of his works in 17 vols. (Venice, 1791–94).

Algarvé, the smallest and most southerly of the provinces of Portugal. The name is Arabic, and means 'a land lying to the west.' It was a Moorish province till 1253. Its area is 1900 sq. m. and its population over 270,000. The northern part of the province is occupied by a range of barren mountains of an average height of 4000 feet, terminating in Cape St Vincent; and the country slopes southward to the narrow level tract along the coast. The plain, unsuitable for grain, produces abundance of fruit and wine. The inhabitants employ themselves chiefly in fishing, in manufacturing salt, and in cultivating fruit. The chief town is Faro.

Algazali. See GHAZALI.

Al'gebra is a branch of pure mathematics. The name is derived from the Arabs, who call the science *Al jebr wa'l muqābalah* ('redintegration and equation'). The term algebra is generally used to denote a method of calculating by means of letters which are employed to represent the numbers, and signs which are employed to represent their relations. Literal arithmetic, then, or multiplying, dividing, &c. with letters instead of Arabic ciphers, is properly only a preparation for algebra; while Analysis (q.v.), in the widest sense, would embrace algebra as its first part. Algebra itself is divided into two chief branches. The first treats of Equations (q.v.) involving unknown quantities having a determinate value; in the other, called the Diophantine or Indeterminate Analysis, the unknown quantities have no exactly fixed values, but depend in some degree upon assumption.

The oldest work in the West on algebra is that of Diophantus of Alexandria, in the 4th century after Christ. It consisted originally of 13 books, and contained arithmetical problems; only six books are now extant. They are written in Greek, and evince no little acuteness. The modern Europeans got their first acquaintance with algebra, not directly from the Greeks, but, like most other knowledge, through the Arabs, who derived it, again, from the Hindus. The chief European source was the work of Mohammed ben Musa, who lived in the time of Khalif Al Mamun (813–833); it was translated into English by Rosen (1831). An Italian merchant, Leonardo Bonaccio, of Pisa, travelling in the East about 1200, acquired a knowledge of the science, and introduced it among his countrymen on his return; he left a MS. work on algebra. The first work on algebra after the revival of learning is that of the Minorite friar Paciolo or Luca Borgo (Ven. 1494). Scipio Ferreo in Bologna discovered, in 1505, the solution of one case of cubic equations. Tartalea of Brescia (died 1557) carried cubic equations still further, and imparted his discoveries to Cardan of Milan as a secret. Cardan extended the discovery himself, and published, in 1545, the solution known as 'Cardan's Rule.' Ludovico Ferrari and Bombelli (1572) gave the solution of biquadratic equations. Algebra was first cultivated in Germany by Christian Rudolf, in a work printed in 1524; Stifel followed with his *Arithmetica Integra* (Nürnb. 1544). Robert Recorde in England, and Pelletier in France, wrote about 1550. Vieta, a Frenchman (died 1603), first made the grand step of using

letters to denote the known quantities as well as the unknown. Harriot, in England (1631), and Girard, in Holland (1629), still further improved on the advances made by Vieta. The *Géométrie* (1637) of Descartes makes an epoch in algebra; it is rich in new investigations. Descartes applied algebra to geometry, and was the first to represent the nature of curves by means of equations. Fermat also contributed much to the science; and so did the *Arithmetica Universalis* of Newton. To these names may be added Maclaurin, Moivre, Taylor, Fontaine; and later, Euler, Lagrange, Gauss, Abel, Fourier, Peacock, De Morgan, Sylvester, and Cayley. See articles on ANALYSIS, BINOMIAL, CALCULUS, DETERMINANTS, DIFFERENCE, DIOPHANTUS, EQUATIONS, FRACTIONS, FUNCTION, GEOMETRY, INVOLUTION, NUMBERS (THEORY OF), PERMUTATIONS AND COMBINATIONS, PROBABILITIES, PROBLEMS, SERIES, &c.

Algeci'ras, or ALGEZIRAS, a town in Spain, in the province of Cadiz, on the Bay of Gibraltar or Algeciras. The town is 5 miles from Gibraltar across the bay, and 9 round by land. Its harbour is bad, but has been improved. The citadel is in a very dilapidated condition. Its climate has made Algeciras a winter resort; its trawlers and whalers make it a fishing-centre. The oranges of Algeciras are famous, as well as its bull-fights. Cork is exported. Population, 20,000. It was the first town in Spain taken by the Moors (711), who held it till in 1344 it was retaken by Alfonso XI., king of Castile, after a twenty months' siege that attracted the interest of all Christendom. Alfonso destroyed the old Moorish town; the modern town was established in 1760 by Charles III. Near Algeciras, on 6th June 1801, the British admiral Saumarez was defeated by the combined French and Spanish fleets, but was completely victorious on the 12th. At Algeciras, from January to April 1906, an international conference met to consider the question of Morocco (q.v.).

Algeria (Fr. *Algérie*), a country on the north coast of Africa, which, since 1830, has been gradually taken possession of by the French, and is now regarded by them as an outlying part of France rather than as a colony. It lies between Morocco on the west side, and Tunis on the east, extending from west to east from about 2° 8′ W. to 8° 50 E. long. It extends from the Mediterranean on the north side to an ill-defined limit in the Sahara on the south. The total area is about 343,500 sq. m.

Configuration of Surface.—The coast-line on the north, about 625 miles long, in the form of a very gentle curve, is little indented, steep and rocky, with only a few capes, and comparatively few good ports. From the coast inwards Algeria is marked off into three distinct regions: in the north, the *Tell* — mountainous, cultivated land, with fruitful valleys; in the middle, the region of Steppes—mountainous tableland, traversed from west to east by a string of brackish lakes or marshes, called *Shotts;* farther south, the Algerian Sahara, with oases. The Tell, on the north side, is marked by a series of mountain-chains, called by the French the Lesser Atlas or Coast Mountains, comprising the mountains of Blidah, 5381 feet high, and Jurjura, with the peak of Little Khedija, 7572 feet. Farther south, forming the south limit of the Tell, is a parallel chain, the Middle Atlas, extending from west to east. The Tell, forming the mountainous, most fertile, and much the most populous section of Algeria, occupies an area altogether of about 54,000 sq. m., with an average breadth of about 47 miles. The central part of the country—the region of plateaux—extends farther south, from the borders of Morocco to those of Tunis. When the winter rains are past, the plateau, usually so bare and dreary, grows suddenly fresh with long grass and aromatic herbs, yielding fodder to the cattle that are there reared. The south limit of the middle tableland of Algeria is formed by the chain forming the north boundary of the Sahara, culminating in Sheliah, 7585 feet, the highest point of Algeria. The Algerian Sahara, constituting the third division of Algeria, and covering an area larger than that of both the divisions to the north of it, consists partly of sandy dunes, partly of country covered after rain with herbage; and there are oases round the wells. The Sahara is diversified by masses of rock, often ranged in long parallel chains. The Wady Igharghar is a channel 750 miles long, running from south to north.

The more considerable streams of Algeria rise in the *middle region*, and have therefore to seek their outlet in the Mediterranean, through passes in the middle and coast ranges. They are mostly of a slow current, with narrow mouths often choked with sand. Though swollen in the winter, they shrink in the summer to a thread, or even quite out of sight. Not one of them is navigable, but they are used for purposes of irrigation.

Climate.—The climate of Algeria is distinguished into only three seasons: winter, from November to February; spring, from March to June; summer, from July to October. In winter is the rainy season. The season most congenial for Europeans is spring. During the great heat of summer rain seldom falls. After a hot day, the night is often very cold. The climate of the Sahara is quite tropical, and very oppressive to Europeans. The planting of forests, drainage, and irrigation are effecting great impovements.

Products.—In recent years, despite the ravages of phylloxera, Algeria has developed into a great wine-producing land. By 1912 the area of vineyards had reached 400,000 acres, the production 200,000,000 gallons, the exports £8,650,000—i.e. about two-fifths of the total export trade. Algeria is also coming to the front as a wheat-growing country. The area planted is between 3,000,000 and 4,000,000 acres, and exports are valued at from £1,000,000 to £2,000,000. The area of barley is about the same, and exports have exceeded £1,000,000. Oats claim some 500,000 acres, with an export of about £500,000. Fruit and vegetables are cultivated in large quantities, and exported to the value of £1,500,000. Millions of gallons of olive-oil are shipped to France. Tobacco and cotton are also grown. Artesian wells have converted desert tracts in the Sahara into cultivated land. Palms and fruit-trees flourish in the oases. The tablelands yield inexhaustible supplies of alfa (esparto grass), which is sent to Britain in ever-increasing quantities (over 100,000 tons in 1912). Algeria reckons from 3,000,000 to 4,000,000 agriculturists, of whom 200,000 to 300,000 are Europeans. Pastoral industries are likewise expanding. The 1911 census showed 1,114,000 cattle, 8,528,000 sheep, and 3,862,000 goats. In the three years 1910–12, 3,000,000 sheep and goats (valued at over £4,100,000) were exported—including some 535,000 from Morocco and Tunis; besides wool and hides, each exceeding a million sterling. Forests (covering from 6,000,000 to 7,000,000 acres) are mostly state property. Their most valuable product is cork; exports (1912) 36,775 tons, worth £521,560. Destructive forest fires are frequent. Algeria is rich in minerals. Her shipments rose to nearly £2,000,000 in 1912, phosphates and zinc each accounting for about a quarter and iron nearly a third of the total. Iron, zinc, and lead are worked in all three departments, and copper in Constantine. Mineral springs abound. Petroleum is obtained at Ain Zeft (Oran). Fishing (sardines, anchovies, mackerel, tunny, oysters,

&c.) is carried on at the chief ports by some 1500 boats.

Trade and Communications. — Goods passing direct between Algerian and French ports may only be carried in French bottoms (*monopole du pavillon*). About half the vessels entered and cleared are French, British ships easily ranking second. Algiers secures half the trade, Oran a quarter, Philippeville a tenth; other ports are Bône, Bougie, Mostaganem, Arzeu. Algiers and Oran are important coaling stations. Imports (six-sevenths of which come from France) and exports (three-fourths to France) both more than doubled in the first decade of the 20th century, totalling £26,785,000 and £21,844,000 respectively in 1912. The chief imports are textiles, clothing, sugar, coffee, hides, paper, oil, coal, automobiles, metals, building materials, parcel-post packets. The chief exports are mentioned under *Products*. Over 2000 miles of railway are open. A line from Oran to Tunis was completed in 1887. Other lines from Oran run west and south into Morocco; a railway is pushing inland *viâ* Boghari from Algiers; and a line from Constantine *viâ* Biskra to Touggourt is regarded as the first stage of a great 'Trans-Saharian.' Caravan routes lead to Timbuctoo, Nigeria, and the Sudan. Trade with Tunis, Morocco, and Saharan oases has developed greatly in recent years.

Population and Administration. — Algeria is divided into three civil departments—Algiers, Oran, and Constantine (to each of which is attached a military division, not yet under civil administration), and the Southern Territories, organised in 1905, consisting of the districts of Ain Sefra, Ghardaia, Touggourt, and the Saharan Oases. The civil departments are frequently increased by taking in portions of the area heretofore under military government. At the census of 1921 the area and population were as follows:

	Sq. Miles.	Pop.
Algiers Department	65,930	1,788,857
Oran Department	44,620	1,305,051
Constantine Department	73,930	2,162,512
	184,480	5,256,420
Southern Territories	169,020	546,044
	343,500	5,802,464

The above figures comprised nearly 800,000 Europeans, of whom 600,000 were French (over 40 per cent. naturalised, including more than 70,000 Jews), 140,000 Spanish, 40,000 Italians, and some 10,000 Maltese (claiming British citizenship). The native population is divided between Arabs and Berbers. To the former belong the Bedouins living in tents or travelling-huts, and dating mostly from the third Arab invasion in the 11th century. They live chiefly in the Tell, tilling the land and rearing cattle, but are also numerous in the Sahara, where they only rear cattle. The Moors, settled in towns, about 2 millions, are partly of Arabian and partly of the old Mauritanian or Berber stock; they are an impoverished and dwindling population. The Kabyles or old Berbers, about 700,000, inhabit mostly Constantine. There are also negroes employed as day-labourers and servants. Besides the above-mentioned ports, the chief centres of population are Tlemçen, Sidi-bel-Abbès, Mascara, Blida, Tizi-ouzou, Sétif; Ain Sefra, Laghouat, Biskra; and in the Sahara (q.v.) Touggourt, Guerrara, Ghardaia, Wargla, El Golea, and the oases of Gurara, Tuat, Tidikelt.

Algeria was under military rule from 1834 to 1871, when a civil governor-general, with residence at Algiers, was substituted for the military governor. The governor-general is assisted by a council whose function is purely consultative. Each department sends two deputies and one senator to the French Chambers, which alone have legislative power over Algeria. The budget is submitted to a Superior Council and to the Financial Delegations, representing French 'colonists' (on the land), urban taxpayers, and Moslem natives. The last-named, who are classed as subjects and not as citizens, have courts and schools of their own. Education is compulsory for Europeans and Jews.

The French troops in Algeria consist of one corps d'armée which, including gendarmerie, numbers upwards of 56,000. A French corps remains in garrison in Algeria for some years; native troops, which may quit Algeria only on extraordinary occasions, consist of four regiments of 'Tirailleurs Algériens' and four of 'Spahis.' There are six regiments of 'Chasseurs d'Afrique' and four of Zouaves, consisting solely of French officers and soldiers. A Foreign Legion, besides, of various nationalities, is mostly officered by Frenchmen. At the head of the Roman Catholic Church in Algeria is the Archbishop of Algiers; there are bishops at Constantine and Oran. Six-sevenths of the inhabitants are Mohammedans.

History.—In the most ancient times we find the Numidians settled in the eastern part of the region, and the Moors (or Mauri) in the west. Under the Romans, the former was included in the province of Africa, while the latter was called Mauritania Cæsariensis. It had then populous cities, which were principally Roman colonies. But its conquest by the Vandals, about 440, threw it back into a state of barbarism, from which it only partially recovered after the Mohammedan immigrants had established their dominion. About the year 935, the city of Algiers (q.v.) was built by an Arabian prince, Zeiri, whose successors ruled the land till 1148, after which it was governed by the Almohades till 1269. It was then split up into many small territories. In 1492 the Moors and Jews who had been driven out of Spain settled in Algeria, and began to revenge themselves on their persecutors by piracy. Ferdinand, the Spanish monarch, attacked them on this account, and took the city of Algiers in 1509. One of the Algerine princes, the Emir of Metija, now invited to his assistance the Greek renegade, Horuk Barbarossa, who had made himself famous as a Turkish pirate chief. This laid the foundation of the Turkish dominion; for when Barbarossa arrived in 1516, he treacherously turned his corsair bands against the emir, whom he murdered, and then made himself sultan of Algiers. His subsequent successes alarmed the Spaniards, who marched an army against him from Oran. Barbarossa was defeated in many encounters, and, at last, being taken prisoner, was beheaded in 1518. His brother was then chosen sultan. He put himself under the protection of the Ottoman court, by the help of a Turkish army drove the Spaniards out of the country, and established that system of military despotism and piracy which the English, Dutch, French, Spaniards, and Americans from time to time in vain endeavoured to extirpate, and which lasted till 1830. In that year the town of Algiers capitulated to a French fleet, and the French took possession of the place.

After the revolution of 1830, General Clausel set about subduing the country, and giving it a regular government; but he encountered the most determined opposition in Abd-el-Kader (q.v.), who soon became the rallying-point of the 'holy war,' which the Marabouts had begun to preach. A disgraceful defeat suffered by the French army at Makta caused the recall of the first governor-general, D'Erlon. Clausel was now sent back to Algeria with the title of marshal; but Abd-el-Kader was soon more powerful than ever, and General Bugeaud had to be sent out from France with reinforcements. In February 1837 Marshal Clausel was recalled, and General Damré-

mont succeeded him. He first attacked the Kabyles of the province of Algiers, and chastised them with severity, and then commenced his great work of taking Constantine, which he ultimately succeeded in storming in May. This victory laid the foundation for the entire subjugation of the province of Constantine.

In 1837 General Valée was appointed governor-general. He, like the others, misunderstood the character of Abd-el-Kader. New treaties were made, which only delayed hostilities. At last, however, deserted by most of his followers, and hemmed in on all sides, the Arab chief was forced to surrender to General Lamoricière at the close of December 1847.

In 1848 the Kabyles broke out into a new insurrection, which, however, was speedily quelled. The French troops penetrated into the far south, almost to the borders of Sahara. In 1853–4, and again in 1856–7, expeditions were organised against the Kabyles. The struggle was sanguinary and barbarous on both sides; and it was only after several defeats sustained by the Kabyles, that, in 1864, peace was restored by the submission of the conquered tribes. Napoleon III. then visited Algeria, and issued a proclamation explaining to the Arabs that Algeria must continue to be united to France, but promising to maintain their nationality, and at the same time giving them assurance that they should always remain in undisturbed possession of their own territories. The Franco-Prussian war in 1870 forced the emperor to withdraw to Europe the greater part of the forces in Africa, and the natives began to entertain hopes of freeing themselves from the yoke of France. Movements were begun in the provinces of Constantine and Oran, which it required all General Durieu's vigilance and activity to hold in check. After this, again, some disorder arose among the colonists themselves, who strongly desired the abolition of the military government—a change which the new republican government at Paris soon gratified them by effecting. To Durieu's place was appointed a civil governor, and under him prefects for each of the three provinces. In 1881, when France entered on a campaign against Tunis, a chief raised the standard of revolt in Algeria, and inflicted considerable losses on the French colonists. Recent years have witnessed the gradual transference of territory from military to civil administration, the penetration of the Sahara (q.v.), and the advancing of Algeria's boundaries.

See *Les Colonies Françaises*, by Petit (1902), and works on Algeria by Gaffarel (1888), Laveleye (1887), Castéran (1900), Bernard (1906), Le Marchand (1913), the 'Guide Joanne;' and in English by Playfair (1874–1902), Wilkin (1900), Hilton-Simpson (1906, 1921), Hilaire Belloc (1906), Nesbitt (1906), Miss Betham Edwards (1912), Devereux (1912), Stott (1914), Casserly (1923).

Alghe'ro, a seaport on the west coast of the island of Sardinia, 15 miles SW. of Sassari. It has a cathedral, a nautical college, and public schools, and is the seat of a bishop. Wine, anchovies, and coral are exported. Pop. 10,000.

Algiers (Fr. *Alger;* Arabic *Al-jezair,* 'the islands'), the capital of Algeria, was built about 935 A.D. by an Arab chief. It rises from the sea-shore up the sides of a precipitous hill in the form of an equilateral triangle. The apex is formed by the Kasbah, the ancient fortress of the deys, which is 500 feet above the sea-level, and commands the whole town. The base is a mile in length. The present city is divided into two parts—the old, or high town; and the new, or low town. With the exception of some mosques, the latter consists of wharfs, warehouses, government houses, squares, and streets, principally built and inhabited by the French; while the former is almost wholly Moorish both in its edifices and inhabitants. The city is intersected by two large parallel streets, Bab-el-Ouad and Bab-azoun, running north and south for more than half a mile; but the new town of Algiers might deceive the traveller into the belief that he is still in Europe, were it not for the throng of swarthy faces he meets. The streets are regular, spacious, and elegant; some of them as handsome as the Parisian Boulevards, and adorned with arcades. The great glory of the city is the Boulevard de la République, with its magnificent terrace, built in 1860–66 by Sir Morton Peto, at a cost of eight million francs. Here may be found as motley a crowd as anywhere in the world, denizens of all nations. Perhaps greater interest attaches to the old Moorish town, which is connected with the new by a steep, narrow, jagged-looking street called the Kasbah, leading down from the fortress of the deys. The houses are square, substantial, flat-roofed; rise irregularly one over the other; and have no windows to the streets, but only peep-holes, fortified with iron gratings instead of glass, so that the houses have a very prison-like appearance. There are numerous mosques and tombs of saints. The French have at great expense improved the port, which is safe and spacious and has a lighthouse. Work upon a great extension scheme was begun in 1922. Algiers is in the front rank of Mediterranean bunkering stations. It is strongly fortified, and can contain 40 warships and 300 trading-vessels. The original harbour was made in 1525 by connecting with the shore four little islands (hence the name of the city). Near the great quays is the railway station, connecting Algiers with Constantine and Oran. The town has supreme courts of justice, the military and civil headquarters for the province, a chamber and tribunal of commerce, a university and schools, a Catholic cathedral, a French Protestant church, an English church, a synagogue, a library, museum, &c. Algiers accounts for nearly half the oversea trade of Algeria; the produce of the interior is exported, the imports being mainly French goods, with British coal, iron, and cottons. About 600 boats are engaged in fishing. Recently Algiers has become famous as a winter residence for Europeans suffering from chest diseases; the village of Mustafa, near the city, is the resort in summer of the governor and wealthier citizens. The city, which had been wretchedly misgoverned by a long succession of Turkish deys, fell into the hands of the French in 1830. Of the 206,595 inhabitants in 1921, the majority were French (including naturalised Jews); other Europeans were mostly Spaniards and Italians; the rest were for the most part Arabs, Kabyles, and other North Africans. For the department and history of Algiers, see ALGERIA.

Algin. On the surface of certain species of seaweed—notably of those belonging to the genus Laminaria—there is sometimes seen a jelly-like material, which is partly formed of a substance called algin, and may be drawn out by the fingers in long tenacious strings. The cell-walls of our common brown seaweeds (Fucus and Laminaria) are, in fact, very mucilaginous, and all contain algin, which has somewhat remarkable properties. This substance was discovered in 1881 by Mr E. C. C. Stanford of Glasgow. If the leaf-like thalli of a Laminaria are immersed in water containing a little carbonate of soda, the whole cellular fabric of the plant becomes broken up in the course of twenty-four hours, forming a thick gelatinous mass containing about 2 per cent. of algin. This mass, after being cautiously heated, is filtered through coarse linen, and the cellulose which is left behind amounts, when dry, to from 10 to 15 per cent. of the air-dried plant. The solution which passes

through the filter contains, in addition to the algin in the form of alginate of soda, some mucilage and dextrine. When sulphuric or hydrochloric acid is added, the algin, or, more correctly speaking, the alginic acid, separates in flocks, and is easily washed and pressed in a filter-press. In this condition it forms a compact cake not unlike new cheese. Chemically, it is a nitrogenous organic acid, and is the insoluble form of algin. When required for use in a soluble state, it is redissolved to saturation in solution of carbonate of soda, when alginate of soda is again formed.

The properties of algin in the soluble form are those of a very viscous gum, drying up to a transparent elastic film. As a size or dressing for textile fabrics, algin goes farther than starch, and is easily rendered insoluble in water. It is used for jujubes, and makes an excellent thickening for soups and jellies. The insoluble form of algin, in the dry state, resembles horn, and can be turned and polished. It is also employed as jacketing for boilers.

Algoa Bay, a broad inlet at the south-eastern extremity of the Cape Province, with a good anchorage; Port Elizabeth lies in the SW. angle.

Algol, a variable star in Perseus, which once in 2 days 20 hours 49 minutes falls from above the second magnitude to below the third, through the interposition between it and us of a dark satellite or companion star. It is believed by some that there is a third invisible component of the Algol system.

Algonquins, the most prominent of the three aboriginal races (the other two being the Hurons and Iroquois) that occupied the great basin of the St Lawrence at the beginning of the 17th century. In what is now the United States, the Algonquin tribes occupied all the coast-region from the NE. limit to the James River in Virginia, and were found westward nearly as far as the Rocky Mountains. The Six Nations, and other tribes of Iroquois, were surrounded by Algonquins. The Abenakis, the Micmacs, the Delawares, the Mohegans, the Shawnees, the Pequots, the Ojibways, the Crees, and perhaps also the Blackfeet and Cheyennes, were among the numerous tribes of Algonquin stock. In a much narrower sense, the name is now applied to the relics of an Indian people in the province of Quebec, Canada. See Leland's *Algonquin Legends of New England* (1884).

Alguacil, or ALGUAZIL (Arabic *al-wazir*, 'the vizier'), is the general name in Spain of the officers intrusted with the execution of justice.

Alhag'i is an Arabic name for a genus of low shrubs from which Manna (q.v.) exudes.

Alham'a (Arabic *Al Hammám*, 'the bath'), a town of Andalusia, Spain, in the province and 24 miles SW. of Granada. Its situation is extremely picturesque, on the edge of a projecting rock; but it is a decayed town, although its warm sulphur baths are still frequented by visitors. It was a famous fortress of the Moors; and there are still remains of Roman and Moorish buildings. The town was much injured by a severe earthquake in the end of 1885. Pop. 8000. —ALHAMA DE ARAGON, 8 miles SW. of Calatayud, has famous mineral springs. Pop. 1300.—ALHAMA, 13 miles SW. of Murcia, is also celebrated for its warm mineral waters. Pop. 8000.

Alham'bra, a fortified suburb of Granada, which forms a sort of acropolis to the city, and in which stand the exquisite remains of the palace of the ancient Moorish kings of Granada. The name is a corruption of the Arabic *Kal'at al hamra*, 'the red castle.' It is surrounded by a strong wall, more than a mile in circuit, and studded with towers. The towers on the north wall, which is defended by nature, were used as residences connected with the palace. One of them contains the famous *Hall of the Ambassadors*. The remains of the Moorish palace are called by the Spaniards the Casa Real. It was begun by Ibn-l-ahmar (1248), and completed by his grandson, Mohammed III., about 1314. The principal decorator was Yusuf I., who regilt and repainted the palace; and even yet, in the dry climate of Spain, traces of his work have been preserved. The portions still standing are ranged round two oblong courts, one called the *Court of the Fish-pond*, the other the *Court of the Lions*. They consist of porticos, pillared halls, cool chambers, small gardens, fountains, mosaic pavements, &c. The

Alhambra.

lightness and elegance of the columns and arches, and the richness of the ornamentation, are unsurpassed. The stone lacework scattered over all the building appears to those ignorant of Arabic mere quaint and beautiful scrolls, but is really a complex arrangement of Arabic poetry and verses from the Koran. The colouring, which often is marvellously preserved, employs only the three primary colours, among which the metallic blue greatly predominates, although the atmosphere has transformed much of it to green. Entrance is by a horseshoe arch, called by the Moors the 'gate of the law,' where the king sat to administer justice. Here, as almost everywhere else, the Moorish diaper-work is much broken, in this instance to make a niche for a wooden image of the Virgin. In the most beautiful room in the palace, the *Hall of the Abencerrages* (q.v.), to the beauty of colour and of ornamentation is added an arcade resting on light and graceful marble arches that run round the place. The most characteristic parts of the Casa Real have been reproduced in the 'Alhambra Court' of the Crystal Palace at Sydenham. A great part of the ancient palace was removed to make way for the palace begun by Charles V., but never completed. Since then it has suffered from the neglect and greed of successive governors; from the French, who blew up eight of its towers and tried to destroy the whole; from earthquake; and from fire (Sept. 16, 1890). There have been partial restorations (1845, 1862, &c.). See works by

Washington Irving (1832; Pennell's ed., 1896), Owen Jones (1848), Murphy (1856), Calvert (1904); also ARABESQUE and ARABIAN ARCHITECTURE.

Ali, the first convert to Mohammedanism, and fourth of the khalifs, was the son of Abu Taleb, the Prophet's uncle. He was the bravest and most faithful follower of the Prophet, whose daughter Fatima he married. Being made khalif in 656 A.D., in the place of the murdered Othman, he was ultimately, after a sore struggle, victorious over those who opposed his authority, and took prisoner Ayesha, the young widow of Mohammed, who was the soul of the rebellion. Ali was assassinated in the year 660, and buried near Kufa. The question of his right to succeed to the khalifate permanently divided the Mohammedan world; the Shiites (q.v.) still reverencing him as next to Mohammed, while the Sunnites (q.v.) abhor his memory. He was famed for wisdom; but the maxims (ed. Fleischer, Leip. 1837) and the lyrics (Boulak, 1840) attributed to him are not authentic.

Aliaska, a peninsula of Alaska (q.v.).

Ali Bey, of Egypt, was a Caucasian slave, born in 1728, who rose to be chief of the Mamelukes in 1763, gained followers, slaughtered the other beys in 1766, and was proclaimed sultan in 1768. He made himself independent of the Porte, and had conquered Syria and part of Arabia, when one of his sons-in-law deserted him, and raised an army against him in Egypt. In April 1773 he was defeated in battle, and a few days after died of his wounds or of poison.

Ali Pasha (surnamed *Arslan*, 'the Lion') was born in 1741, at Tepeleni, a village of Albania. His mother, a vindictive and merciless woman, inspired him with the remorseless sentiments that animated herself. His youth was passed in extreme peril and hardship, for the neighbouring pashas had robbed his father of nearly all his possessions, in the effort to recover which, young Ali was repeatedly defeated. It is said that the change in his fortunes arose from his accidental discovery of a chest of gold, with which he raised an army of 2000 men, gained his first victory, and entered Tepeleni in triumph. On the very day of his return, he murdered his brother, and then, on the charge of having poisoned him, imprisoned his mother in the harem, where she soon after died. He next reconciled himself to the Porte by helping to subdue the rebellious Vizier of Scutari. Appointed lieutenant to the Derwend Pasha, an officer charged with the suppression of brigandage, he rendered the high-roads more insecure than ever, sharing in the plunder of the *klephts* (robbers). The result was his deposition by the Porte; but he speedily bought back its favour, for he was a master-hand at bribery. Shortly after this, he did such good service to the Turks in their Austro-Russian war of 1787, that he was named pasha of Trikala in Thessaly; at the same time he seized Janina, of which he got himself appointed pasha by the instrumentality of terror, a forged firman, and bribery. In 1797 he entered into alliance with Napoleon, who sent him engineers; but next year, after the battle of Aboukir Bay, he wrested the seaport Prevesa from the French. After a three years' war, he subdued the Suliots, for which the Porte promoted him to be governor of Rumili. About this time, he revenged on the townsfolk of Gardiki an outrage done to his mother forty years before, by the murder of 739 male descendants of the original offenders, who themselves were all dead. Within his dominions, Ali maintained strict order and justice. Security and peace reigned, high-roads were constructed, and industry flourished, so that the European travellers, with whom he willingly held intercourse, considered him an active and intelligent governor. From 1807, when he once more formed an alliance with Napoleon, Ali's dependence on the Porte was merely nominal. Having failed, however, to obtain at the peace of Tilsit, Parga, on the coast of Albania, and the Ionian Islands, he now entered into an alliance with the British. For years he was despot of Albania, Thessaly, Epirus, and part of Macedonia. Deeming his power securely established, he caused the commanders of the Greek Armatoles (or militia), who had hitherto aided him, to be assassinated one by one, while at the same time he put to death the assassins. The Porte resolved at length to end the power of this daring rebel, and in 1820 Sultan Mahmoud sentenced him to be deposed. Ali resisted for a time several pashas that were sent against him, but at last surrendered, on the security of an oath that his life and property would be granted him. Nevertheless he was put to death, February 5, 1822. See Davenport, *Life of Ali Pasha* (1861), and Boppe, *L'Albanie et Napoléon* (1914).

Alias is a name given in England to a second writ issued when the first has failed, but is more commonly used in both England and Scotland as part of an indictment describing a prisoner who goes by more names than one. The indictment used to be in Latin, and *alias dictus* is (late) Latin for 'otherwise called.' Under the Indictments Act, 1915, Rule 7, all that is necessary is that the description of an accused person shall be such as is reasonably sufficient to identify him. In Scotland the accused may be indicted by the name given by him when examined on declaration; and the prosecutor need not set forth any 'alias' by which the accused has passed. Aliases are generally used at trial for the purpose of proving previous convictions under the other names.

Al'ibi (Lat., 'elsewhere') is a defence resorted to in criminal prosecutions, when the accused, in order to prove that he could not have committed the crime, tenders evidence to the effect that he was in a different place at the time the offence was committed. In Scotland, though not in England, the prisoner, if he is to be tried by jury, must give notice to the crown of a special defence of *alibi*, stating where he was at the time of the crime. If he is to be tried summarily, notice of a plea of *alibi* must be given to the prosecutor prior to the examination of the first witness for the prosecution.

Alican'te, chief town of a like-named province in Spain, on a bay of the Mediterranean, 46 miles NE. of Murcia by rail. The castle of St Barbara commands the town and bay. The town with its background of mountains looks picturesque from the sea. The church of San Nicolas de Bari is dedicated to Alicante's tutelary saint. It is among the leading seaports of Spain, and its harbour is spacious and secure. The chief exports are esparto grass, oranges, wine, almonds, and liquorice-root; tobacco, petroleum, dried fish, timber, coal, and spirit for strengthening wine are imported. A great tobacco-factory employs many hands; but, though helped by the railway to Madrid (282 miles), the local trade is not great. The climate is well suited for invalids. In 1331 the town was besieged by the Moors, and again by the French under Asfeld in 1709. In 1873 it was unsuccessfully bombarded by two warships manned by Cartagenan insurgents. Pop. 42,000.—The province (2200 sq. m.; pop. 500,000) was formed in 1834 of parts of the old kingdoms of Valencia and Murcia. The surface is diversified with mountain-ranges in the north and west, but is more level to the south, with fertile valleys. The chief products are esparto grass, rice, sugar-cane, and fruits. The wine

has a high reputation. Bees and silkworms are reared. There are lead and copper mines. The coast-dwellers are engaged chiefly in tunny and anchovy fishing and the carrying trade.

Alien (Lat. *alienus*) is a general term denoting a person who is not a citizen of the state. The rules determining what persons are, or are not, citizens of a particular state depend on the law of that state, and vary in different states. The law as to British nationality and the status of aliens was consolidated and amended in the British Nationality and Status of Aliens Act, 1914 (4 and 5 Geo. V. chap. 17), which repeals the earlier statutes, and by two important Acts of 1918 and 1922. An 'alien' is defined in the act as 'a person who is not a British subject'—i.e. who is neither a natural-born British subject nor a naturalised British subject. British nationality is acquired at birth, irrespective of parentage, by persons born within the king's dominions and allegiance, or on board a British ship. Further, any person born out of the king's dominions whose father was a British subject at the time of that person's birth is a natural-born British subject. A naturalised British subject is one who has acquired British nationality by Naturalisation (q.v.). A woman acquires by marriage the nationality of her husband. Thus the wife of a British subject is a British subject, and the wife of an alien is an alien. But where a man ceases during the continuance of his marriage to be a British subject, his wife may make a declaration that she desires to retain British nationality, and thereupon she remains a British subject. A woman who, having been a British subject, has by her marriage become an alien does not by reason only of the death of her husband, or the dissolution of her marriage, cease to be an alien.

British nationality may be lost by a person, when in a foreign state and not under any disability, becoming naturalised, voluntarily and formally, in that state. But a British subject may not become naturalised during a war in an enemy state; such naturalisation is an act of treason (Reg. *v.* Lynch, 1903, 1 K.B. 444). A person who, under English law, is a British subject may, under the law of a foreign state, be a subject also of that state. Thus a child born in England of a French father is both a British subject and a French citizen. In the case of such double nationality, the person is entitled, if of full age and not under disability, to make a 'declaration of alienage,' and thereupon ceases to be a British subject. But a natural-born British subject of double nationality has been held not to be entitled to make a declaration of alienage in time of war, so as to become solely a subject of the enemy state; nor can he, by executing a declaration of alienage, claim discharge from the army. When a person ceases to be a British subject, by declaration of alienage or otherwise, his minor children also become aliens; but any child who has in this way become an alien may, within one year after attaining his majority, make a declaration that he wishes to resume British nationality, and thereupon he again becomes a British subject.

The allegiance due from an alien resident is known as 'local' allegiance; see ALLEGIANCE.

By the common law of England, an alien, though the subject of a friendly state, was incapable of inheriting, or acquiring by purchase, lands within the realm. This rule was abrogated by the Naturalisation Act of 1870, and now real and personal property of every description may be acquired, held, and disposed of by an alien; and a title to such property may be derived through, from, or in succession to an alien, in the same manner in all respects as through, from, or in succession to a natural-born British subject. It is also expressly enacted that an alien shall be triable in the same manner as if he were a natural-born British subject. The main distinctions between the legal position of aliens and that of British subjects are that an alien is excluded from holding any public office, and from exercising any franchise, parliamentary or municipal, and that he cannot own a British ship or a share in one. Under the Aliens Restrictions Act, 1914, and relative orders, many restrictions were imposed even on alien friends during the war. An alien has no enforceable right to enter British territory. The Aliens Act, 1905, prohibits the landing in the United Kingdom of undesirable alien steerage passengers from 'immigrant' ships. Under the act an alien is deemed 'undesirable' if he is without the means of decently supporting himself and his dependants, if he is diseased or infirm and likely to become a charge on the rates or otherwise a detriment to the public, or if he has been sentenced for certain crimes. There is a saving clause for those fleeing from religious or political persecution. The act also empowers the Secretary of State to make rules for the expulsion from the United Kingdom of aliens convicted of offences of a certain gravity by any court and recommended by that court for expulsion, or of aliens who have become within a limited time after their arrival in the United Kingdom a charge on the rates, or who have been sentenced in a foreign country for crime. The Aliens Restriction Act, 1919, continues certain powers conferred upon the executive government during the war with respect to aliens, and imposes some restrictions unknown before the war.

An alien whose sovereign or state is at war with Great Britain is an alien enemy; see ENEMY.

Restrictions on alien immigration have been imposed in Canada, in Australia, and in many other British colonies. Thus in Canada, under the Alien Labour Act, 1906, it is unlawful to prepay the transportation or in any way assist the immigration of any alien under a previous contract to perform labour. The act does not apply to persons employed as domestic servants. Similarly in Australia persons who are under contract to perform manual labour may be excluded. In several colonies there is special legislation regulating the admission of aliens of coloured races.

In many states restrictions are still imposed on the right of aliens to hold land. In the United States there is considerable diversity in the legislation of the several states on this matter.

In the United States, as in England, children born out of the country are not aliens if their fathers are citizens. The alien, though not admitted to the same political and municipal rights as the citizen, is protected in person and property against wrong.

Aligarh, a fort in the district of the same name in the United Provinces of India, between Agra and Delhi. It was stormed by Lord Lake in 1803, being then the principal depot of the French general acting for Sindhia. Ten days after the outbreak at Meerut in 1857, the native troops in garrison mutinied; and the loss of the place almost cut off the communications between the south-east and the north-west. Its great and successful Muslim university (1920) superseded the Muhammadan Anglo-Oriental college founded by Sir Saiyid Ahmad Khan. Both Shiahs and Sunnis are found amongst the students.

Alignment. See CALLERNISH, CARNAC, STANDING-STONES.

Aliment, in the law of France and in that of Scotland, has retained the meaning which it pos-

sessed in the Roman law (*Dig.* 34, 1, 6), and signifies the food, dwelling, clothing, and other things necessary to the support of life, or such money as may be judicially demanded in lieu of them. In Scots law a father is liable to aliment children so long as the latter are unable to support themselves, and in the higher ranks still longer, if the child be destitute, especially in the case of daughters. As to illegitimate children, see BASTARD. The obligation does not extend to a son's wife, nor to brothers or sisters or other collateral relations. The duty devolves on the father's representatives, and also on the mother, if the father be indigent or dead. The grandfather must aliment his destitute grandchildren. The obligation in every case is satisfied by a bare subsistence, although this may vary slightly according to the social position of the parties. Children are liable to aliment indigent parents. A husband is liable to aliment his wife, but, unless he has acquired property by his marriage, he is not bound to support his wife's parents. In the case of both wife and child, it is enough to offer them a home. The liability to aliment a wife is not terminated by a judicial separation, but only by divorce. Persons unable to support themselves, through age, or bodily or mental disease, are entitled to relief under the poor-law, but this aliment may be recovered from the pauper's relatives. Money may be settled in trust for the aliment of persons, so as to exclude the diligence of creditors.

Alimentary Canal is the name given to the principal part of the digestive apparatus. It extends from the mouth to the anus, having in man an average length of about thirty feet. Passing through the head and chest, it includes the *teeth*, the organs of mastication; the *salivary glands*, the organs of insalivation; the *tongue*, *pharynx*, *œsophagus* or gullet, the organs of deglutition. In the abdomen and pelvis there are the *stomach*, and *small* and *large intestine*. Intimately concerned in the process of digestion, there are numerous small glands in the lining membrane of the canal, besides such large ones as the *salivary glands*, the *liver* and *pancreas*, which pour their secretions into the interior of the canal by ducts opening upon its inner surface. See articles on the various portions, and (especially) DIGESTION.

Alimony signifies, in English law, the allowance which a married woman is entitled to receive out of her husband's estate, *pendente lite*, or after decree of judicial separation. On any decree for dissolution or nullity of marriage the court has power to make an order that the husband shall provide a gross sum or an annual sum for the support of the divorced wife (Matrimonial Causes Act, 1907, sect. 1). In the case of divorce, the court can deal with the settlements. Alimony is sometimes called maintenance. In the United States also it is fixed by the court, and generally proportioned to the standing and mode of life of the parties.

Alisma'ceæ, a small order of monocotyledonous plants, interesting on account of its remarkably close affinities to the dicotyledons, through Ranunculaceæ. It contains about ten widely distributed genera of herbaceous plants, usually growing in water or even floating. The fleshy rhizome of the water-plantain (*Alisma plantago*), common in Britain, is sometimes used as food in Eastern Russia. See also ARROWHEAD (*Sagittaria*).

Alison, ARCHIBALD, born at Edinburgh in 1757, studied at Glasgow University and Balliol College, Oxford, and in 1784 received Anglican orders. He had held several preferments, including a prebend of Salisbury, and the perpetual curacy of Kenley, in Shropshire, when in 1800 he removed to Edinburgh, and served there as an Episcopal minister till 1831. He died 17th May 1839. Alison was best known by his *Essays on the Nature and Principles of Taste* (1790), whose second edition, in 1811, gave occasion to an admiring article by Jeffrey, in the *Edinburgh Review*. They advocate the 'association' theory of the sublime and beautiful, and are written much in the style of Blair, as are also 2 vols. of Alison's Sermons (1814–15).—His son, WILLIAM PULTENEY ALISON, born in 1790, was professor of the institutes of medicine in the university of Edinburgh from 1822 to 1856. In 1840 he published a pamphlet to show how the inadequate provision for the poor in Scotland led to desolating epidemics; and he was also author of a dozen other medical and miscellaneous works. He died September 1859.—A younger son was SIR ARCHIBALD ALISON, the historian. Born at Kenley, Shropshire, in 1792, he entered Edinburgh University in 1805, and in 1814 was called to the Scottish bar. Three years after, he was making £600 a year, and this large income allowed him to form a fine library, and make four continental tours, till, in 1822, he was appointed advocate-depute, an office he held till 1830. He now began to appear as a writer on law, politics, and literature. His *Principles of the Criminal Law of Scotland* (2 vols. 1832–33) is still a standard authority. In 1834 Sir Robert Peel appointed him sheriff of Lanarkshire, and thenceforth he resided at Possil House, Glasgow. In 1845 he was elected Lord Rector of Marischal College, Aberdeen; of Glasgow University in 1851; and a baronetcy was conferred on him in 1852. He died 23d May 1867. His *History of Europe during the French Revolution* (10 vols. 1833–42) narrates the events from 1789 to 1815, and was continued under the title of *The History of Europe from the Fall of Napoleon to the Accession of Louis Napoleon* (9 vols. 1852–59). He also published Lives of Marlborough, Castlereagh, and Sir Charles Stewart, *The Principles of Population, Free Trade and Protection, England in 1815 and 1845*, &c., besides contributing for many years to *Blackwood's Magazine* a series of tedious articles on Tory politics. His *magnum opus*, *The History of Europe*, designed, as was said, 'to prove that Providence was on the side of the Tories,' is a work of immense industry and respectable accuracy, but shows little insight, and in style is excessively wordy; yet it passed through numerous editions and was translated into several languages. See his Autobiography (2 vols. 1883).—His son, SIR ARCHIBALD ALISON, G.C.B., born at Edinburgh in 1826, was educated at Glasgow and Edinburgh universities, and entered the army in 1846. He served in the Crimean war; the Indian Mutiny, losing his left arm at the relief of Lucknow; the Ashanti expedition; and the Egyptian campaign, leading the Highland brigade at the battle of Tel-el-Kebir. In 1885–89 he held the command at Aldershot, and he wrote *On Army Organisation*. He died 5th February 1907.

Aliwal, a Punjab village on the left bank of the Sutlej, 9 miles W. of Lodiana. It was the scene of a fierce conflict between the British and Sikh forces, 28th January 1846. The Sikhs had crossed the river, when they were attacked by Sir Harry Smith, defeated, and driven back with great slaughter. The victory of Aliwal is described as being technically 'without a fault.'

Aliwal North, capital of a like-named district in the Cape Province, on the Orange River, 160 miles NNW. of East London, with which it has rail connection. Near are the Aliwal sulphur springs. Pop. 4500, of whom 2000 were whites.—ALIWAL SOUTH, now called MOSSEL BAY, in the Cape Province, 30 miles SW. of George. Mossel Bay is

a summer-resort and centre of a large forwarding trade. The port is protected from westerly gales by Cape St Blaize. It is connected with Cape-town by rail (312 miles) *viâ* Worcester. Pop. 4500.

Alizarin, the colouring matter used in the dyeing of Turkey red, exists in the madder root as a glucoside, which, when boiled with acids or alkalies, gives glucose and alizarin. But in 1868 Graebe and Liebermann discovered a method of manufacturing it from the coal-tar product Anthracene (q.v.), now one of the most important branches of the coal-tar colouring industry. This manufacture, begun on a commercial scale by Perkin in 1869, speedily put an end to the growing and importing of madder root. One ton of alizarin was reckoned equal in colouring power to nine tons of madder; and the cost of the artificial dye was less than a third of the natural dye, though inferior in permanence. Alizarin crystallises in dark-red prisms, melting at 296° C., and moderately soluble in alcohol. With certain metallic oxides it forms a coloured insoluble salt known as a *lake*, and its important dyeing applications are due to this property. Alizarin is one of those dyes which need the presence of one of these oxides before a fast dye is produced in the texture to be treated. See DYEING.

Aljubarrota, a village on a height in Estremadura, Portugal, about 60 miles NE. of Lisbon, where John of Portugal, with the assistance of English allies, gloriously defeated the Castilians on 14th August 1385, thus securing Portuguese independence.

Alkahest, or ALCAHEST, the universal solvent of the alchemists. See ALCHEMY.

Alkalies. The word *alkali* is of Arabic origin, *kali* being the name of the plant from the ashes of which an alkaline substance was first procured. The name now denotes a class of substances having similar properties. The common soluble Bases (q.v.) or alkalies are three in number—potash, soda, and ammonia. The first two are hydroxides of the metals; the last a solution of ammonia gas in water, and was formerly called the *volatile* alkali owing to its tendency to reform ammonia gas and water. Potassium and sodium are often referred to as the *alkaline metals*, and have very soluble hydroxides. Potash, being largely present in the ashes of plants, is called the vegetable alkali; and soda, predominating in the mineral kingdom, is designated the mineral alkali. The *alkaline earths*, as they are called—lime, magnesia, baryta, and strontia—are distinguished from the former by their hydroxides being only slightly soluble in water. The distinguishing property of alkalies is that of turning litmus blue and vegetable yellows reddish brown. Blues reddened by an acid are restored by an alkali. The alkalies have great affinity for acids, and combine with them, forming salts, in which the peculiar qualities of both alkali and acid are generally destroyed; hence they are said to neutralise one another. In a pure state alkalies are extremely caustic, and act as corrosive poisons. Combined with carbonic acid, especially as bicarbonates, they are used to correct acidity in the stomach; but the injudicious and continued use of them is attended with great evil. The alkalies and some of their salts (e.g. citrates, tartrates) are also used to increase the secretion of urine, and (ammonia excepted) to diminish its acidity. Ammonia in small doses is a powerful stimulant. An account of the several alkalies will be found under the heads of POTASSIUM, SODA, LITHIUM, and AMMONIA; and of the alkaline earths, under LIME, MAGNESIUM, BARYTA, and STRONTIUM.

Alkalimetry. Commercial potash and soda always contain greater or less quantities of foreign substances, such as sulphate of potash, common salt, silicates, oxide of iron, water, &c., which diminish the percentage of real alkali in a given weight. It is important, then, for the manufacturer to have some simple and ready means of determining the proportion of pure carbonate of potash or soda contained in any sample, that he may be able to judge of its value. This is done by means of *volumetric analysis*. This supplies a quick and ready method for at once determining the amount of acid or alkali in any liquid or solid. A known weight of the substance is dissolved in water and made up to a known volume. In the case of liquids, a definite volume is diluted with water and made up to a standard volume, either 250, 500, or 1000 cubic centimetres. The solutions used in volumetric analysis are always made up to a standard strength. A standard solution is said to be *normal* when the molecular weight of the substance in grams is dissolved in water and made up to a volume of 1000 c.c. (a litre). If this is too concentrated, then the solution is made semi-normal (half the concentration of normal), or deci-normal (one-tenth the concentration of normal). Now the molecular weight of potassium hydroxide, KOH (caustic potash), is 56; therefore a normal solution is made by dissolving 56 grams in water and diluting it till it fills a litre flask. The flask is pear-shaped, with a long, narrow neck, on which there is a mark engraved. When filled up to this mark it contains exactly 1000 c.c. of liquid. Flasks of this description can be got in 100, 250, 500, and 1000 c.c. capacity, these being the usual sizes used in volumetric work.

A normal solution of nitric acid (HNO_3) contains 63 grams of pure acid per litre. But a normal solution of sodium carbonate (Na_2CO_3, molecular weight 106) only contains 53 grams per litre, because a molecule of monobasic hydrochloric acid can only neutralise half a molecule of sodium carbonate.

$$Na_2CO_3 + 2HCl = 2NaCl + CO_2 + H_2O.$$

Sodium Carbonate. Hydrochloric Acid. Salt. Carbonic Acid. Water.

Similarly, a normal solution of sulphuric acid (molecular weight 98) has only 49 grams per litre. Before a standard or volumetric solution of hydrochloric or sulphuric acid can be made, one has to take some alkali which can be obtained very pure, and use it as the standardising agent. For this purpose sodium carbonate is employed, since it can be got in a pure state. Fifty-three grams are dissolved and made up to 1 litre with distilled water in the special graduated flask. The sulphuric acid normal solution is now made in the following way: By means of a hydrometer and the use of specific gravity tables a solution is made containing roughly a little more than 49 grams in the litre. It is now wanted to ascertain how much of the normal alkaline solution is required exactly to neutralise 10 c.c. of this sulphuric acid. The exact point when the acid is all neutralised, and before excess of alkali is added, is shown by an *indicator*. Litmus solution is frequently used, being coloured blue in presence of alkali, and red in presence of acid. The neutral point is shown when neither red nor blue colour is seen, but a change from red to blue or *vice versâ* is just taking place, the liquid being vigorously stirred. Other indicators are phenolphthalein (red in acid, almost colourless in alkali), methyl-orange, &c.

In order to perform the *titration* accurately, use is made of the *pipette* and the *burette*. The pipette is a glass tube, drawn out to a fine point at the lower end, having a bulb in the middle and a narrow tube at the upper end. When it is filled up to a mark on the neck the capacity is exactly 10, 20, or 25 c.c. according to the pipette used. For most purposes the 10 c.c. pipette is generally employed. The liquid is sucked up above the mark, and the upper end is closed by the forefinger. On relieving the pressure of the finger, the level of the liquid

falls; pressure again being applied when it is at the mark. The solution is then allowed to run into a beaker. The burette is a long, narrow glass tube which is held in a stand in a vertical position. It is graduated in cubic centimetres, and has a capacity of 50 c.c. By means of a stopcock at its lower extremity any amount of liquid can be run off, the number of cubic centimetres being read off the graduated scale. To perform a titration the burette is filled with the normal solution of alkali, 10 c.c. of the acid being pipetted into the beaker. An *indicator* is added, and the contents of the burette are slowly run into the beaker. When the indicator shows the neutral point the stopcock is shut, and the quantity which has been run out is read off. By this means one finds out whether 10 c.c. of the acid neutralises exactly 10 c.c. of the normal alkali solution. If not, the acid must be diluted sufficiently until 10 c.c. is exactly equivalent to 10 c.c. of normal alkali. The solution now obtained is a normal solution of sulphuric acid, and can be used in a similar way for determining the strength of any alkali, or for making up standard solutions of alkalies. In every chemical laboratory there are always kept several stock solutions of standard strength, so that it takes only a few minutes to carry out a titration. Owing to the speed and accuracy of working volumetric analysis is of great importance, and is employed when possible rather than other kinds of quantitative chemical analysis. There are many applications of volumetric analysis in general use, standard solutions of the following being largely used: (1) potassium permanganate and potassium bichromate for the estimation of iron (in the ferrous state); (2) sodium thiosulphate for estimating the amount of chlorine in bleaching-powder, &c.; (3) sodium chloride for the estimation of silver; (4) silver nitrate for the estimation of chloride. Many other estimations can be made, too numerous to mention here.

Alkaloids, a term used to designate the nitrogenous basic principles existing naturally in plants. These are often called vegetable alkaloids to distinguish them from alkaloids of animal origin. It must not, however, be assumed that when a plant contains an alkaloid it is of necessity the active principle, which may rather be a resin, glucoside, volatile oil, or vegetable acid. Most of the alkaloids consist of carbon, hydrogen, nitrogen, and oxygen, and are solid bodies at the ordinary temperature. A few, however, only contain carbon, hydrogen, and nitrogen, and these are for the most part liquids which can be distilled without decomposition. The more important of this class are coniine and nicotine. The alkaloids have generally an energetic action on the animal system, and hence are every day employed in small doses as medicine; whilst in comparatively large doses they are powerful poisons. Many of them have an alkaline reaction on vegetable colours; but in the greater number this property is possessed only in a very faint degree, and it is by analogies, based on other properties, that they are all classed under one title. There is only one property common to all alkaloids—namely, that they combine directly with acids to form more or less stable salts, capable of undergoing double decomposition; as, for example, sulphate of quinine, muriate of morphine, &c. Most of the alkaloids have an acrid, bitter taste, and are sparingly soluble in water, more freely so in alcohol, chloroform, and ether. As many alkaloids occur together in the same plant, and other substances are also present, such as glucosides, tannic acid, malic acid, &c., the extraction and purification is a difficult matter. In general, the vegetable extract is treated with dilute acid, with which the alkaloid combines to form a soluble salt. The residual vegetable matter is then filtered off, and to the solution a strong alkali is added which usually precipitates the alkaloid. The alkaloid is then purified by crystallisation from a suitable solvent such as alcohol, ether, or chloroform. Several of the alkaloids have been prepared artificially, such as piperine and coniine; although the more important alkaloids, quinine and morphine, as yet have defied artificial production. Generally speaking, the alkaloids are tertiary, aromatic bases; but the constitutions of many of them have not yet been determined. It is known, however, that many alkaloids are derivatives of pyridine, quinoline, or isoquinoline. The following list contains the names of the chief alkaloids, with the plants from which they are obtained:

Alkaloids.	Source.
Aconitine	Aconite.
Angosturine	Cusparia.
Atropine	Belladonna.
Belladonnine	Belladonna.
Bebeerine	Bebeeru Tree.
Berberine	Barberry.
Berberine	Calumba.
Cocaine	Coca Leaf.
Coniine	Hemlock.
Curare	Arrow Poison.
Cytisin	Laburnum.
Laburnine	Laburnum.
Daturine	Stramonium.
Ergotinine	Ergot.
Eserine or Physostigmine	Calabar Bean.
Hyoscine	Henbane.
Hyoscyamine	Henbane.
Lupuline	Hops.
Morphine	Opium.
Codeine	Opium.
Narcotine	Opium.
Nicotine	Tobacco.
Pilocarpine	Jaborandi.
Piperine	Black Pepper.
Quinine	Cinchona.
Cinchonine	Cinchona.
Cinchonidine	Cinchona.
Sinapine	Mustard.
Strychnine	Nux Vomica.
Brucine	Nux Vomica.
Veratrine	Cevadilla.

Animal alkaloids is a term, now disused, which used to be applied to bodies similar to alkaloids obtained from animals—e.g. urea, creatin, &c. Many alkaloids can be detected by chemical methods even when present in very small quantity. This has an important bearing in medico-legal cases. In the well-known murder case against Dr Crippen in the summer of 1910, it was proved that he had used hyoscine hydrobromide, an alkaloid, for poisoning his victim. Although the body had lain in a cellar for a few months, by means of a colour-test which reacts for only a few definite alkaloids the presence of this salt was proved beyond a doubt. It is said that one ten-thousandth of a milligram of hyoscine hydrobromide can be detected.

Alkan, CHARLES HENRI VALENTIN MORHANGE, professional name of a pianist, music teacher, and composer who was born in Paris in 1833, and died there, 29th March 1888. His compositions for the piano include marches, préludes, caprices, and études of great technical difficulty.

Al'kanet (*Anchusa tinctoria*, to which the name Alkanet or Alkanna—Arabic *Al-chenneh*—more strictly belongs) is a native of the Levant and of the south of Europe, extending as far north as Hungary. The root is sold under the name of alkanet or alkanna root, and is imported from the Levant. It appears in commerce in brittle pieces of the thickness of a quill or of the finger, the rind blackish externally, but internally dark red. It is sometimes adulterated with dyed roots of common alkanet (*Anchusa officinalis*). The root of *Lawsonia inermis*, a Lythraceous plant, was formerly often imported under the same name. Alkanet-root contains a resinous red colouring-matter, called *Alkanna Red* (*Alkannin* or *Anchusin*). The colour which it yields is very beautiful, but not very durable. It is readily soluble in oils and alcohol, and is therefore in very general use amongst perfumers for colouring oils, soaps, pomades, lip-salves, &c., and in the composition of stains and varnishes. The name of alkanet is also extended to the whole genus Anchusa, of which three species are common in Britain.

Alkan'na. See HENNA.

Alkarsin. See CACODYL.

Al Kasr al Kebir, Moorish name for Alcazar-Kebir (q.v.).

Al-Kindi. See ARABIAN LANGUAGE.

Alkmaar, an old town of the Netherlands, on the North Holland Canal, 19 miles N. by W. of Amsterdam by rail. It is well built, has very clean streets, and is intersected by broad canals. It possesses a Gothic town-house; the church of St Lawrence dates from the 15th century. Alkmaar has manufactures of sail-cloth, sea-salt, soap, vinegar, and leather, and trade in cattle, grain, butter, and excellent cheese—of which it exports enormous quantities. Alkmaar held out against the Duke of Alba, who besieged it in 1573. Here, on October 18, 1799, the Duke of York signed a not very honourable capitulation. Pop. 22,000.

Alkoran. See KORAN.

Al'lah (compounded of the article *al* and *ilâh* —i.e. 'the god,' a word cognate with the Hebrew *Eloah*), the Arabic name of the supreme god amongst the heathen Arabs, adopted by Mohammed for the one true God. See MOHAMMED, MOHAMMEDANISM.

Allahabad ('city of God'), the seat of the government of the United Provinces of Agra and Oudh, occupies the fork of the Ganges and Jumna, thus forming the lowest extremity of the *Doab*, or the country of *Two Rivers*, 390 miles SE. of Delhi. The situation of Allahabad, at the confluence of the holy streams of India, besides giving the city its sacred appellation, has rendered it a much-frequented place of pilgrimage for the purposes of religious ablution. With the exception of a few ancient monuments of elaborate and tasteful workmanship, the native part of the city consists of mean houses and narrow streets; the European quarter is vastly superior. The nucleus of the city appears to have been the native fort, which, on the east and south, rises directly from the banks of both rivers, while towards the land its artificial defences are of great strength. The Europeans of the garrison occupy well-constructed barracks. Beyond the fort are the cantonments for the native troops. There are numerous handsome villas and bungalows, rendered still more attractive and agreeable by avenues of trees.

A stronghold has existed at the junction of the rivers from the earliest times, but the present fort and city were founded by Akbar in 1575. The Mahrattas held Allahabad from 1736 till 1750; the city and district were ceded to the British in 1801. On the 6th of June 1857, the insurrection, which had begun at Meerut on 10th May, extended to Allahabad. Though the Europeans continued to hold the fort, yet the mutineers were, for some days, undisputed masters of all beyond; and between the ravages of the marauders and the fire of the garrison, the city soon became little better than a heap of blackened ruins. General Neill arrived on the 11th, and recovered Allahabad on the 18th; Havelock arrived shortly afterwards.

The position of Allahabad renders it naturally a centre of commerce and civilisation. It commands the navigation both of the Ganges and of the Jumna. It is on the direct water-route between Calcutta and the Upper Provinces; and is a main station, not only on the Grand Trunk Road, but also on the East Indian Railway. The most noteworthy buildings are the great mosque and the Sultan Khossor's caravanserai—a fine cloistered quadrangle. The fort is of red stone, and is approached by a very handsome gate: it contains the famous pillar of Asoka (240 B.C.). Near by is the temple covering the undying banian tree; it is said to communicate with Benares by a subterranean passage, through which flows a third holy river, the Saraswati, visible only to the eye of faith. Allahabad possesses the government offices and courts, Roman Catholic cathedral, Mayo Memorial and town hall, a free public library, an institute, post and telegraph offices, an hospital, theatres, bazaars, &c. The Muir Central College, instituted by Sir W. Muir, was opened in 1886; and a university, instituted in 1887, immediately became the great educational centre of the province. A great fair is held annually in December and January, which lasts for a month, and is visited by about 250,000 persons. The cotton, sugar, and indigo produce of the fertile district of Allahabad is brought in large quantities into the city. There is a good local trade in gold and silver ornaments, and in European furniture. Allahabad is distant from Calcutta, by land, 564 miles, and 89 from Benares. The Indian National Congress has repeatedly held its sittings in Allahabad (as in 1888 and 1893). The town is a considerable mission centre. Pop. (1872) 143,693; (1881) 148,547; (1901) 175,748; (1921) 155,970, of whom about 50,000 were Mohammedans.

ALLAHABAD district is 85 miles in length by 50 in breadth; area, 2800 sq. m. The district is mainly agricultural, is well watered, and vegetation is luxuriant. Allahabad is the headquarters district of a division which has an area of 13,746 sq. m.

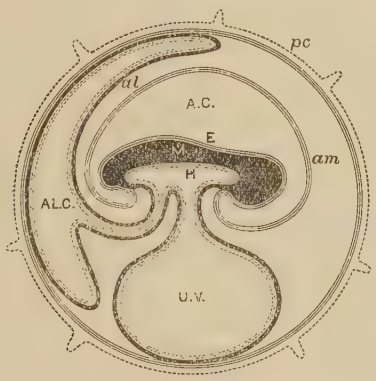
Allamanda, a tropical American genus of Apocynaceæ (q.v.), cultivated in hothouses for the sake of its large beautiful yellow flowers. *Allamanda cathartica*, a native of the West Indies, has violently emetic and purgative properties.

Allan, DAVID, a Scottish painter, Wilkie's forerunner, was born at Alloa in 1744. From 1755 to 1762, he studied at the academy for painting and engraving established in Glasgow by the printer Foulis; and in 1764 the liberality of friends enabled him to go to Rome, where he resided sixteen years. There in 1773 he gained the gold medal of St Luke's Academy for the best historical composition. His subject was the 'Origin of Painting, or the Corinthian Maid drawing the Shadow of her Lover.' This picture, the highest effort of Allan's powers, was engraved by Cunego, and is now in the National Gallery at Edinburgh. In 1777 Allan came to London, where he painted portraits; in 1780 he removed to Edinburgh, and in 1786 succeeded Runciman at the head of the art academy there. His works subsequent to this date were chiefly of a humorous description, and illustrative of Scottish domestic life. His illustrations of Allan Ramsay's *Gentle Shepherd* became very popular, but are of no great merit. He died at Edinburgh, 6th August 1796.

Allan, SIR WILLIAM, a distinguished Scottish historical painter, was born at Edinburgh in 1782, and educated at the High School. Having early displayed a taste for drawing, he was apprenticed to a coach-painter, and studied at the Trustees' Academy, with Wilkie for a fellow-pupil. He subsequently entered the schools of the Royal Academy of London, and in 1803 exhibited 'A Gipsy Boy with an Ass;' but in 1805 he set out for St Petersburg, where the friendly interest of his countryman, Sir Alexander Crichton, the imperial family physician, soon procured him employment. In the Russian capital he spent several years, making occasional tours to the south of Russia, the Crimea, Turkey, and Circassia. In 1814 he returned to Edinburgh, and next year exhibited his 'Circassian Captives,' which, thanks to Sir Walter Scott, was sold by subscription for 1000 guineas. After a severe attack of ophthalmia, he visited Italy, Turkey, Greece, and Asia Minor. In 1826 he was elected an Associate of the London Academy; in 1835, an Academician. In 1838 he became president of the Royal Scottish Academy,

and on Wilkie's death in 1841, he was knighted and appointed Limner to Her Majesty for Scotland. He died in his painting-room, 22d February 1850. Though not a great painter, Allan gave such an impulse to historical painting, especially of national subjects, as entitles him to a high place in the history of Scottish art.

Allantois, a sac-like fœtal membrane formed in the embryos of reptiles, birds, and mammals, as an outgrowth from the posterior end of the alimentary tract, just in front of the anus. While it never really occurs in animals lower than reptiles, it may be fairly said to be represented in the fish *Lepidosiren* and in the amphibia by a urinary bladder. In all higher animals, however, it is precociously developed and modified for other purposes. It forms a large sac, enveloping the embryo outside the Amnion (q.v.). In reptiles and birds the surface is traversed by an abundant network of blood-vessels, and the important function of embryonic respiration is thus discharged. In placental



Fœtal Membranes of a Mammal:

E, embryo; M, its middle layer or mesoderm; H, gut-cavity lined by inner layer or endoderm; U.V., umbilical vesicle; *al*, allantois, with allantoic cavity, AL.C.; *am*, amnion, with amniotic cavity, A.C. *am* represents the united inner portion of double folds, the outer limbs of which form the sub-zonal membrane (not lettered) under *pc*, the zona pellucida. (From Turner.)

mammals a further functional change (see FUNCTION) is exhibited, since the allantois aids in the development of the chorion, and this again is intimately connected with the walls of the uterus, in the structure known as a *Placenta* (q.v.). The blood of the embryo is exchanged with the blood of the mother, and embryonic nutrition is thus effected. The precocious urinary bladder is thus respiratory in reptiles and birds, and nutritive in mammals. In amphibia, the allantois persists as stated; in reptiles, the stalk dilates to form the permanent bladder; in birds, the whole atrophies. In mammals, the stalk of the allantois (1) dilates to form the bladder, while the lower portion (2) narrows to form the *urethra*. The *urachus*, or stalk connecting the bladder to the ventral wall of the body, is also of allantoic origin.

Allard, JEAN FRANÇOIS, was born in 1785, and in 1815 was adjutant to Marshal Brune (q.v.), after whose assassination he quitted France, intending to emigrate to America. Having changed his plan, he entered the service of Abbas-Mirza of Persia, and in 1820 proceeded to Lahore. There Runjeet Singh made him generalissimo of the Sikh army, which he organised and trained in the European modes of warfare. In 1833 he revisited Paris, was received with distinction, and made French *chargé d'affaires* in Lahore. Having distinguished himself in the battles of Runjeet Singh with the Afghans, he died at Peshawar, 23d January 1839.

Allegany, a manufacturing town of New York, 70 miles S. by E. of Buffalo; pop. 2000.

Alleghany, or ALLEGHENY, a river which, rising in Pennsylvania, unites with the Monongahela at Pittsburg to form the Ohio. Though it flows through a hilly country, yet it is navigable for nearly 200 miles above Pittsburg, whence by the Ohio and the Mississippi the navigation extends to the Gulf of Mexico.

Alleghany Mountains, a term sometimes used as synonymous with the Appalachian system (see APPALACHIANS), but by some writers applied only to that portion of the system which extends from Pennsylvania to North Carolina, and which forms the watershed between the Atlantic and the Mississippi. It is sometimes used in a still more restricted sense. The ridges are remarkable for their parallelism and regularity, all the main valleys being longitudinal. The general direction is nearly parallel with the Atlantic coast. Their average height in Pennsylvania and Virginia is from 2000 to 2400 feet above the sea; but their original height has been greatly reduced by denudation or erosion. They are composed of stratified rocks of the Silurian, Devonian, and Carboniferous ages. They are rich in coal, iron, and limestone, and their forests supply large quantities of valuable timber.

Allegheny, or ALLEGHANY, now a portion of Pittsburg, but till 1907 ranking separately as one of the chief manufacturing cities of Pennsylvania, situated on the Alleghany River, opposite Pittsburg proper, is the terminus of important railway lines, and has besides its factories numerous important public institutions, such as the Western Penitentiary, a Carnegie Public Library, a Presbyterian theological seminary and other theological schools, an astronomical observatory, a Catholic orphanage, and a college for coloured persons. The chief industries of the place include rolling-mills for iron, cotton and woollen mills, breweries, foundries, a steel factory, blast-furnace, and locomotive works. It is a favourite place of residence for the business men of Pittsburg; but, though in many respects a suburb of that city, it had a separate municipal organisation till 1907. Pop. (1880) 78,681; (1890) 105,287; (1900) 129,896; (1906) 145,240. See also ALLEGANY, ALLEGHANY.

Allegiance is derived from the Old French *lige*, and is closely connected with the word liege, being the relation of a liege-man to his liege-lord. 'Allegiance,' says Blackstone, referring it to another source, 'is the tie or *ligamen* which binds the subject to the sovereign, in return for that protection which the sovereign affords the subject.' Allegiance is the highest legal duty of a subject, and consequently its violation, Treason (q.v.), is the highest legal offence. Allegiance is of three kinds. (1) *Natural allegiance* is such as is due from natural-born subjects and also from persons who become naturalised citizens. 'All subjects,' Sir Edward Coke explains, 'are equally bounden to their allegiance as if they had taken the oath; and the taking of the corporal oath is but an outward declaration of the same.' In return for the protection which the state affords to its subjects, every subject, independently of any express promise, is bound to bear true allegiance to the sovereign of the state, and to defend the state from attack from without or from within. Persons entering on certain offices are required by law to take the *oath of allegiance* or an affirmation in lieu of the oath. The taking of the oath does not add to the natural duty of a British subject. The Promissory Oaths Act of 1868 abolished the separate oaths of allegiance, supremacy, and abjuration formerly required, and substituted therefor a simple promise of allegiance

to the king, his heirs, and successors. The oath is exacted, on acceptance of office, from the persons named in the schedule to the Act of 1868, from members of parliament, and from a few other persons. (2) *Acquired allegiance* is due from aliens becoming naturalised. Aliens who seek naturalisation are required to take the oath of allegiance. (3) *Local* or temporary allegiance is that obedience and temporary aid due by an Alien (q.v.) to the state in which he resides. If a resident alien commits an offence which in the case of a natural-born subject would amount to treason, he may be punished as a traitor. Local differs from the higher kinds of allegiance in this, that it endures only so long as the alien resides within the king's dominions, whereas natural allegiance, whether implied or expressed, is at common law perpetual in character. See ALIEN, NATURALISATION.

In the United States there is no personality to whom allegiance is due; the sovereignty resides in the combined will of the people, as expressed in the constitution and laws. Allegiance is twofold—(1) to the central government, which is paramount; (2) to the state of which one is a citizen. Children of citizens of the United States born without the limits of the country owe allegiance to the United States.

By the law of England, and agreeably to the spirit of the constitution, a usurper in actual possession of the crown, or king *de facto*, is entitled to allegiance, because he then represents, not the sovereign whom he has dispossessed, but the general will in which the ultimate sovereignty of England resides. The sovereign may by proclamation summon his subjects to return and take part in the defence of the kingdom, when menaced or endangered.

The papal pretensions at various times gave rise to difficulties with regard to the allegiance of Roman Catholics. The sentence of Pius V., renewed by Gregory XIII. and Sixtus V., deposing Elizabeth and releasing her subjects from all obligations of allegiance, led to increase of the rigour of the penal laws. Father Parsons boldly maintained that the deposing power was an article of the Catholic faith. In 1603, however, thirteen influential priests signed a protestation of allegiance to Elizabeth, in which they emphatically declared their readiness to defend their sovereign, in spite of all pretended excommunications, from any attempts to put in force such sentences. The declaration came too late for Elizabeth to take action upon it. But after the Gunpowder Plot, when parliament was enacting fresh penal statutes, James I., with a view of establishing a distinction between Catholics whose loyalty he could depend upon and those whose opinions rendered them dangerous, and of affording some small measure of relief to the former, framed in 1607 the famous Oath of Allegiance, which caused confusion and division in the Roman Catholic camp for nearly a century. James's object was conciliatory, but he defeated that object by requiring Catholics not merely to assert their own rejection of the deposing power, but to pronounce the doctrine held by many learned doctors and canonised saints of their church to be 'impious and heretical.' In 1690 the form of the oath was altered in a sense hostile to Roman Catholics, and it was not until 1778 that it was freed from all objection on their part. The definition of the pope's infallibility by the Vatican Council in 1871 gave occasion to a pamphlet by Mr Gladstone, entitled *The Vatican Decrees in their bearing on Civil Allegiance* (1874), which once more revived controversy.

The oath of abjuration was imposed in 1701 upon members of parliament and all holders of public offices, including clergymen, teachers, barristers, solicitors, &c. It was a declaration in favour of King William and the Revolution Settlement, and against the 'late King James,' and concluded with the words, 'upon the true faith of a Christian.' The form of oath was altered in 1714, when the first Pretender had assumed the title of James III. and VIII.; and the scruples felt in Scotland as to whether the oath was consistent with the Treaty of Union were removed by statute. It was also at this time imposed on voters in Scottish elections. After special provision had been made for the case of Catholics, and of Quakers and other persons whose conscience prevented them from taking an oath, the oath of abjuration was remodelled in 1858, one form being substituted for the separate oaths of abjuration, supremacy, and allegiance, and either house of parliament being enabled, by resolution in individual cases, to dispense with the reference to Christianity. The new form was just a declaration of allegiance to the queen, a promise to support the Protestant succession, and a denial of the authority of foreign princes and prelates. The matter was afterwards separately dealt with in the Clerical Subscription Act, 1865; the Parliamentary Oaths Act, 1866; and the Offices and Oaths Act, 1867; but the law was consolidated by the Promissory Oaths Act, 1868. By this statute, a short oath of true allegiance, usable by Catholics and Jews, was substituted for the old oaths of abjuration, supremacy, and allegiance; an official oath of true service was provided for public officers other than judges; and a judicial oath of true service, and to do right without fear or favour, was provided for the judges. All these oaths concluded, 'so help me God;' which words, in the case of the oath of allegiance taken by members of parliament, gave rise to the famous Bradlaugh case. The Oaths Act of 1888 enables any person who objects to being sworn to make an affirmation, whenever and wherever the taking of an oath is required by law. See ALIEN, CATHOLIC EMANCIPATION, JEWS, OATH, PARLIAMENT.

Allegory (Gr., made up of *allos*, 'other,' and *agoria*, 'speaking'), a figurative representation, in which properties attributed to the apparent subject really refer to another subject not named but intended to be understood. It is supposed to be a figurative application of real facts. The New Testament *Parable* (q.v.) is a short allegory, marked by simplicity and brevity, and with one definite moral. Allegory differs from metaphor chiefly in its being longer sustained, and more fully carried out in its details; while metaphor is confined to a single expression or to a sentence or two, allegory runs through the whole representation. It is not abstract ideas alone that are adapted to allegorical treatment; not only may virtue and vice, for instance, be personified and treated allegorically, but real persons may be represented by allegorical persons. Nor is language alone the medium of allegory; it may be addressed to the eye, and is often exhibited in painting, sculpture, or the actor's art.

We find allegory in use from the earliest ages. Orientals are specially fond of it. As examples from antiquity may be cited the comparison of Israel to a vine in the 80th Psalm; the beautiful passage in Plato's *Phædrus*, where the soul is compared to a charioteer drawn by two horses, one white and one black; the description of Fame in the fourth book of the *Æneid*. In the mediæval literature of Europe allegory played a principal part, when almost every poet was an imitator of the *Roman de la Rose* of Guillaume de Lorris and Jean de Meung. Of later allegories Bunyan's *Pilgrim's Progress* is perhaps the most complete; Spenser's *Faerie Queene*, Swift's *Tale of a Tub*, Addison's 'Vision of Mirza' in the *Spectator*, and

Thomson's *Castle of Indolence* are well-known examples. See Saintsbury, *Flourishing of Romance and Rise of Allegory* (1897); also APOLOGUE, BEAST-FABLES, FABLE.

ALLEGORICAL INTERPRETATION is that kind of interpretation by which the literal significance of a passage is either transcended or set aside, and a more spiritual and profound meaning elicited than is contained in the form or letter. The apostle Paul himself allegorises, or, at least, interprets spiritually the history of the free-born Isaac and the slave-born Ishmael (Gal. iv. 24). Allegorical interpretation with reference to the Old Testament was most extensively employed by Philo Judæus, a philosophical Jew of Alexandria, and a contemporary of Jesus. His writings stimulated the allegorising tendencies of the Alexandrian school of Christian theologians, the most famous of whom are Clemens Alexandrinus and Origen. The latter went so far as to say that 'the Scriptures are of little use to those who understand them as they are written.' Thus he maintained that the Mosaic account of the Garden of Eden was allegorical, that Paradise only symbolised a high primeval spirituality, and that the expulsion from the Garden lay in the soul's being driven out of its region of original purity. The Neo-Platonists allegorised the ancient myths. See EXEGESIS.

Allegretto, a movement somewhat slower than Allegro (q.v.).

Allegri, GREGORIO (1585?–1652), born in Rome, became a priest and member of the choir in the Sistine Chapel, and composed concertos, motets, and especially the famous *Miserere* for nine voices, annually performed in the Sistine Chapel.

Alle'gro (It., 'lively'), in music, implies that a piece or passage is to be performed in a quick or lively style. An allegro may be a whole piece of music, or a movement (usually the first) of a symphony, sonata, quartet, or the like.

Alleine, JOSEPH, next to Baxter the most widely read of the Puritan writers, was born at Devizes early in 1634. He was educated at Lincoln and Corpus Christi Colleges, Oxford, where he was noted for the severity of his studies, and was ordained in 1654. He began his ministry at Taunton in the same year, and laboured there until his ejection with the two thousand in 1662. Together with the grandfather of the Wesleys, he now became an itinerant preacher, and was in consequence frequently fined and imprisoned. His last years were dark and troubled, but death brought him relief, 17th November 1668. He was buried according to his wish in the chancel of his old church at Taunton. His *Alarm to the Unconverted*, of which 20,000 copies were sold at once on its appearance (1672), and 50,000 on its republication under a new title three years later, is still deservedly read. His interesting *Remains* were published in 1674.

Alleluia. See HALLELUJAH.

Allemande is a German national dance (hence the French name, meaning 'German'), originally Swabian, in various kinds of waltz *tempo*. It was introduced into France in the time of Louis XIV., and became extremely popular on the stage under Napoleon I. The name has also been used for a lively German folk-dance in two-four time, and especially for an orchestral composition in slow and measured time, not for dancing. This last forms a movement in suites.

Allen, BOG OF, a series of morasses east of the Shannon, in King's and Queen's Counties and Kildare, Ireland, comprising about 150,000 acres, interrupted by strips of arable land.—LOUGH ALLEN, in Leitrim, is a lake on the upper course of the Shannon (q.v.), and has an area of 8900 acres.

Allen, CHARLES GRANT, born at Kingston, Canada, February 24, 1848, graduated in 1870 from Merton College, Oxford. In 1873–77 he was first professor, then principal, of a college at Spanish Town in Jamaica, and he afterwards settled in England. He wrote *Physiological Æsthetics* (1877); *Colour Sense; The Evolutionist at Large; Vignettes from Nature; Flowers and their Pedigrees; The Evolution of the Idea of God* (1897); *Darwin* (1885); *Force and Energy* (1888); besides a long series of novels, including *Philistia* (1884), *Babylon*, *In All Shades*, *A Terrible Inheritance*, *This Mortal Coil*, and *The Great Taboo* (1890). *The Woman who Did* (1895), a novel with a purpose, evoked a storm of controversy. He wrote much for periodicals and contributed to *Chambers's Encyclopædia*. He died at Hindhead, 25th October 1899. See Life by E. Clodd (1900).

Allen, ETHAN (1738–89), born at Litchfield, Conn., took part in the capture of Fort Ticonderoga (1775), and did good service in Montgomery's expedition to Canada, but was taken prisoner, and not exchanged till 1778. A member of the Vermont legislature, he wrote a deistical work (1784). See Life by De Puy (1853).

Allen, JAMES LANE, born in Kentucky in 1849, lectured in Kentucky University, but made a name as a novelist by a series of tales of life and nature in Kentucky—amongst them *The Choir Invisible* and *The Reign of Law*.

Allen, JOHN (1771–1843), was born near Edinburgh, graduated M.D. at Edinburgh, travelled with Lord and Lady Holland, was an *habitué* of Holland House, and became warden and master of Dulwich College. He translated Cuvier, contributed largely to the *Edinburgh Review*, and wrote a famous treatise on the royal prerogative.

Allen, RALPH (1694–1764), son of a Cornish innkeeper, made a fortune by a lease of the posts (see POST-OFFICE), and for his varied benevolence was immortalised by Fielding as 'Squire Allworthy,' and by Pope. His home was Prior Park, near Bath. See Life by Peach (1895).

Allen, WILLIAM, Cardinal, was born of gentle parentage at Rossall, Lancashire, in 1532, and in 1547 entered Oriel College, Oxford, of which, in 1550, he was elected fellow. In 1556 he became principal of St Mary's Hall, and Catholic though he was, he retained this office till 1560; nor was it till the following year that he had to seek refuge in Flanders. Even then he stole back home in 1562, that his native air might cure a wasting sickness; but when, in 1565, he landed once more in the Low Countries, it was never to return to England. He received priest's orders at Mechlin, in 1567 made a pilgrimage to Rome, in 1568 founded the English college at Douay (q.v.), and in 1587 was created a cardinal during his fourth visit to Rome. He never afterwards quitted the imperial city, dying there on 16th October 1594. At the time of the Armada, Allen signed, if he did not pen, the *Admonition to the People of England*, in which he declared Elizabeth to be deposed, and urged the Catholics to take up arms against her. He possessed, in addition to moral and intellectual gifts of a high order, a remarkable personal influence, which made him as long as he lived the unrivalled leader of his co-religionists. The decadence of the Catholic cause dates from his death. But his college at Douay was perhaps the chief means of preserving the Catholic faith from being so utterly destroyed in England as it was in the northern kingdoms of the Continent. He wrote several works on the religious and political controversies of his time, the chief of which are his *Apology for the Seminaries* (1581), described by Bolton as 'a princely, grave,

and flourishing piece of natural and exquisite English,' and a *Modest Defence of English Catholics*, in answer to Cecil's *Execution of Justice*. See his *Letters and Memorials*, edited by Fathers of the Oratory, with introduction by Dr Knox (1882), and Martin Haile, *An Elizabethan Cardinal* (1914).

Allenby, Sir Edmund, first Viscount Allenby (1919), field-marshal, born in 1861 at Brackenhurst, near Southwell, Nottinghamshire, served in Bechuanaland, in Zululand, and in the Boer war. In the European war he commanded cavalry in France; and as commander-in-chief of the Egyptian Expeditionary Force he took Beersheba and Gaza (1917), and won a decisive victory over the Turks in Palestine in September 1918. In 1919–25 he was High Commissioner for Egypt. See Jerusalem.

Allenstein, a town of East Prussia, 65 miles S. of Königsberg, has a mediæval castle; pop. 33,000. Allenstein and district decided by plebiscite in 1920 to remain German.

Allentown, a manufacturing town of Pennsylvania, in a fertile district on the Lehigh River, 60 miles NW. of Philadelphia by rail. The Lehigh Valley is rich in iron ore and anthracite coal; large blast-furnaces, ironworks, and rolling-mills are in operation in the neighbourhood; and there are manufactures of furniture and linen thread. The inhabitants are mostly of German descent. Allentown possesses a Lutheran college, a female college, an academy, a military institute, and a Lutheran seminary. Pop. (1860) 8025; (1880) 18,063; (1900) 35,416; (1910) 51,913; (1920) 73,502.

Alleppi. See Aulapolai.

Allerion, in Heraldry, an eagle with expanded wings, but without beak or feet. The best-known examples of it are in the arms of the duchy of Lorraine, and of the family of Montmorency. In the earlier heraldry it has both beak and claws, and is described as a large species of eagle.

Alleyn, Edward, a famous actor, contemporary with Shakespeare, was born in 1566, and died in 1626. His connection with the English stage as partner and step-son-in-law of Philip Henslowe (q.v.) invests his life with interest to the student of the drama; but it is as the munificent and pious founder of Dulwich College (q.v.) that he principally claims the remembrance of posterity. The building of the college was begun in 1613, and in 1619 the institution obtained the royal charter, after some obstruction on the part of Lord Bacon, who wished the king to apply part of the grant to the foundation of two lectureships at Oxford and Cambridge. Alleyn himself and his wife took up quarters in the college, living on equal terms with the sharers of his bounty. See his *Memoirs* by Collier (1841); Collier's *Alleyn Papers* (1843); and Warner's *MSS. of Dulwich College* (1881).

All-Fools' Day. See April.

Allia (more correctly, *Alia*), a small stream in ancient Latium, which fell into the Tiber, 11 miles N. of Rome. It was the scene of the defeat of the Roman army by the Gauls under Brennus in 387, or, according to others, 390 B.C.

Alliaceous Plants are primarily those of the genus Allium (Onion, Leek, Shallot, Garlic, Ramsons, Rocambole), or others nearly allied to it. The term is, however, extended to denote the possession of the characteristic odour and taste (due to the presence of an essential oil), presented in varying degrees by all members of that important genus. Thus the alliaceous flavour and odour are strongly developed in plants belonging to very different orders—e.g. the common treacle-mustard (*Alliaria officinalis*, natural order Cruciferæ)—while certain species of Meliaceæ are used as garlic in Java.

Alliance. See Treaty, Holy Alliance, League, Succession Wars, Triple Alliance.

Allibone, Samuel Austin, LL.D., bibliographer, was born in Philadelphia, April 17, 1816. At first engaged in mercantile pursuits, he was an earnest student of English literature, which bore fruit in 1853, when he began his *Critical Dictionary of English Literature and of British and American Authors* (3 vols. 1858–70–71), containing in all notices of 46,499 authors. The second and third volumes greatly surpassed the first in accuracy and completeness. In 1891 a supplement in two volumes, containing entries of 93,780 works, was published by J. Foster Kirk; beginning where the original work left off (in A to O in 1850, in O to Z in 1870; see Bibliography). Dr Allibone also published an *Alphabetical Index to the New Testament* (1869); *Poetical Quotations* (1873); *Prose Quotations* (1876); *Great Authors of All Ages* (1879). In 1879 he became head of the Lenox Library, New York; and he died at Lucerne, 2d September 1889.

Allier, a department in the centre of France (named from the river Allier, which rises in Lozère, and flows 233 miles through Haute-Loire, Puy-de-Dôme, and Allier to the Loire below Nevers); area, 2848 sq. m.; pop. (1901) 421,074; (1921) 370,950. It is a hilly district, especially in the south, sloping down towards the river Loire in the north, and is partly woody, but generally well cultivated, producing the usual kinds of grain with wine and oil. It is also rich in minerals, especially iron, coal, antimony, manganese, and marble. The majority of the population is engaged in agriculture. Mineral springs are found at Vichy and elsewhere. The chief town is Moulins.

Allies, Thomas William, born at Bristol in 1813, passed from Eton to Wadham College, Oxford, where he obtained a first class in 1832. He became examining chaplain to Bishop Blomfield, who in 1842 presented him to the rectory of Launton, Oxfordshire. In 1850 he joined the Roman Catholic communion, and published the *See of St Peter*, accounting for his conversion. His marriage excluding him from the priestly office, he became secretary to the Catholic Schools Committee in 1853. He died 13th June 1903. Among his works were *Per Crucem ad Lucem* (1879), *The Throne of the Fisherman* (1887), *Monastic Life* (1896), &c. See Life by his daughter (1924).

Alligation, from a Latin word signifying 'to bind together,' is a rule in arithmetic which teaches how to solve such questions as the following: 3 lb. of sugar at 6d. are mixed with 5 lb. at 10d.; what is the price of a pound of the mixture? or: In what proportion must sugar at 6d. be mixed with sugar at 10d., to produce a mixture at 8½d.? The solution of the first is $\frac{3 \times 6 + 5 \times 10}{3 + 5} = 8\frac{1}{2}$d.

In the second, the proportional number for one ingredient is the difference between the price of the other and that of the mixture; the number for the cheap sugar is therefore 1½, and for the dear, 2½, which are as 3 : 5, so that there must be 3 lb. at 6d. for every 5 lb. at 10d. If there are more than two ingredients, the problem becomes indeterminate—that is, it admits of a variety of answers. Thus: Of three metals, whose specific gravities are 10, 15, and 16, it is required to compose an alloy, whose specific gravity shall be 14. The conditions will be answered by mixing them in any of the following proportions: 1, 2, 1; 2, 2, 3; 6, 2, 11, &c.

Alligator (Span. *lagarto*, 'a lizard'), a genus of Crocodilia, the highest sub-class of reptiles. The alligator family (Alligatoridæ) includes three genera—Alligator, Caiman, and Jacare, which differ from crocodiles in their shorter and broader

head; in their more unequal teeth; in the presence of pits on the upper jaw, which receive the first and fourth lower-jaw teeth; in the limited extent of the union between the two lower jaws, which does not extend backwards beyond the fifth tooth; in the separation between the scales of neck and back; and in other less notable characters. Generally, however, they resemble crocodiles both in habit and structure—e.g. in the lizard-like body, with powerful tail and short legs; in the bony armature of the skin; in the abundant teeth fixed in sockets; in the large head, with very solid skull and nostrils at the end of the snout; in the double ventricle of the Heart (q.v.); and so on. The alligators are now almost confined to the warmer parts of America, but fossil forms indicate a much wider distribution. They vary in size from 2 to 20 feet. The genus Alligator includes a few species, of which the most familiar is *Alligator lucius*, the pike-headed alligator of the Mississippi

Pike-headed Alligator (*Alligator lucius*).

region. The snout is broad, flattened, and rounded; the nostrils are separated by a prolongation of the nasal bone; the feet are webbed to about the middle; the bony plates of the back are not articulated together, and there are none on the ventral surface. There are twenty teeth on each of the upper and lower jaws. The lids of the gleaming eyes are fleshy and smooth. The genus Caiman is at home in tropical South America, but extends northward to Mexico. The nostrils are undivided, the webs of the feet are still more rudimentary, the bony plates of the back are articulated to form a connected armour, and there is also a ventral shield of jointed plates. The eyelids are strengthened by an internal bony plate, and there are twenty teeth on each jaw above, and twenty-two below. The Jacare closely resembles the Caimans, and is also South American. There are fewer teeth, rougher eyelids, and minor differences of little importance. All these forms occur abundantly in the rivers, especially in quiet corners where the current is not too rapid. During the floods of the wet season they frequent adjacent basins, while in other circumstances they avoid the consequences of cold or drought by burying themselves in the mud and remaining torpid till the return of suitable conditions recalls them to active life. They feed for the most part on fishes, which they are said to stun with their tails; but many of them are extremely, and often unadvisedly, omnivorous. After seizing some land animal, such as sheep or pig, they frequently allow it to drown without relaxing their grip, and then return to the shore to eat it at leisure. While most of them seem timid and shy of man, especially when on land, they are sometimes emboldened by hunger to venture an attack. They are to a large extent nocturnal animals, and their loud harsh bellow is a familiar sound in the districts which they frequent. The large eggs are laid on shore in a hollow in the sand, covered over with grass and reeds, and left to themselves and the sun's heat. As many as sixty may be laid in one nest, arranged in separate layers. The young are developed before the period of flooding, and are carefully tended by the mother alligator. In spite of this, the majority probably fall victims to large fishes, birds of prey, and hardened male alligators. The flesh of some forms (Jacare) is eaten by Indians and negroes. It has a musky flavour, and this smell is also very characteristic at pairing time. An alligator oil, said to burn well, is also utilised; and the tough skin forms a strong leather, useful for saddlery and other purposes. Fossil remains prove the ancient standing of the alligator family.

Alligator Apple. See CUSTARD APPLE.

Alligator Pear. See AVOCADO PEAR.

Allingham, WILLIAM, a popular poet, of English origin, born at Ballyshannon in Ireland in 1824. He contributed to the *Athenæum*, *Household Words*, and other journals, while doing the duties of a commissioner of taxes in London, and in 1874 he succeeded Froude as editor of *Fraser's Magazine*. His first volume of poems appeared in 1850; his second, *Day and Night Songs*, in 1854, and in an enlarged form, illustrated by Rossetti and Millais, the year after. In 1864 first appeared in book form *Laurence Bloomfield in Ireland*, a narrative poem of nearly 5000 lines, in decasyllabic couplets, on contemporary Irish life. He published in 1877, *Songs, Ballads, and Stories*, a collection of new pieces, together with revised versions of earlier poems; and in 1887, *Irish Songs and Poems*. In 1874 he married Helen Paterson, who, born in 1848, made herself a name by her book-illustrations and her water-colours. Allingham died 18th November 1889. His Diary was published by his wife in 1907.

Alliteration is the frequent occurrence in a composition of words beginning with the same sound. In Old German, Anglo-Saxon, and Scandinavian poetry, alliteration took the place of rhyme. This kind of verse, in its strict form, required that in the two short lines forming a couplet three words should begin with the same sound, two in the first line or hemistich, and one in the second; as in the following couplet of Anglo-Saxon poetry:

*F*irum *f*oldan
*F*rea almihtig.—CÆDMON.

Alliterative poems continued to be written in English after it had assumed its modern form; the most remarkable example is *Piers the Plowman*, a poem of the 14th century, of which the following is a specimen, the two hemistichs being written in one line:

*M*ercy hight that *m*aid, | a *m*eek thing withal,
A full *b*enign *b*urd, | and *b*uxom of speech.

Even after the introduction of rhyme, alliteration continued to be largely used as an embellishment of poetry. Shakespeare ridicules the excessive use of it by many poets of his time in *Midsummer-Night's Dream* (V. i. 147), where he makes Quince say in his prologue:

With *b*lade, with *b*loody *b*lameful *b*lade,
He *b*ravely *b*roach'd his *b*oiling *b*loody *b*reast.

In *Love's Labour's Lost* (IV. ii. 57) he burlesques it again, making Holofernes 'something affect the letter, for it argues facility;' and Sidney, in his *Astrophel and Stella*, 15, thus addresses poets given to its use:

You that do Dictionaries' method bring,
Into your *r*imes, *r*unning in *r*attling *r*ows.

Poets in all times have employed it for the sake of the point and emphasis it often gives a line. The satirist Churchill speaks of himself as one

Who often, but without success, had prayed
For *a*pt *a*lliteration's *a*rtful *a*id.

He had prayed without success on this occasion, for the appearance of alliteration here is an illusion of spelling. A fine example of its effect in poetry occurs in the well-known lines of Coleridge (*The Ancient Mariner*):

> The fair *b*reeze *b*lew, the white *f*oam *f*lew,
> The *f*urrow *f*ollowed *f*ree.

But the perfect ear of that consummate master of rhythm could tolerate only its occasional use. Shakespeare was himself a master of alliteration in its proper use, and as a poetical device it has survived to our own day.

But alliteration is not confined to verse; the charm that lies in it exercises great influence on human speech generally, as may be seen in many current phrases and proverbs in all languages, as 'life and limb,' 'house and home,' 'kith and kin,' '*Land und Leute*,' &c. It often constitutes part of the point and piquancy of witty writing. Among modern writers this application of alliteration is perhaps most felicitously exemplified by Sydney Smith, as, when in contrasting the conditions of a dignitary of the English Church and of a poor curate, he speaks of them as 'the Right Reverend Dives in the palace, and Lazarus-in-orders at the gate, *d*octored by *d*ogs and *c*omforted with *c*rumbs.'

In the early part of the 17th century, the fashion of hunting after alliterations was carried to an absurd excess; even from the pulpit, the chosen people of God were addressed as 'the *ch*ickens of the *ch*urch, the *s*parrows of the *s*pirit, and the *s*weet *s*wallows of *s*alvation.'

See Professor Skeat's elaborate essay prefixed to vol. iii. of the reprint of Bishop Percy's *Folio Manuscript* (1868); Guest's *English Rhythms* (2d ed. by Skeat, 1882); Schipper's *Englische Metrik* (1895).

Allium, a genus of Liliaceæ (q.v.), containing about 250 species. These are perennial, or more rarely biennial, herbaceous plants, usually producing tunicated bulbs by their thickened and concentric leaf bases, and are natives chiefly of the temperate and colder regions of the northern hemisphere. Garlic, Onion, Leek, Shallot, Chive, and Rocambole (q.v.) are species of this genus in common cultivation. A number of other species are occasionally used on account of their characteristic nutritive and flavouring qualities in different countries. Nine species are natives of Britain, of which the most common is *Allium ursinum*, Ramsons or Wood-garlic, a species with much broader leaves than most of its congeners. It is most frequently found in moist woods and hedge-banks; but occasionally in pastures, in which it proves a troublesome weed, communicating its powerful odour of garlic to the whole dairy produce. Crow Garlic (*Allium vineale*), another British species, is occasionally troublesome in the same way, in drier pastures. Both are perennial, and to get rid of them their bulbs must be perseveringly rooted out when the leaves begin to appear in spring.

Al'loa, a seaport town in Clackmannanshire, on the left bank of the tidal Forth, 6½ miles E. of Stirling, and 35 WNW. of Edinburgh. Among its buildings are the county court-house (1865), the handsome new town-hall (1888), the corn exchange (1862), and the parish church (1819); and its special feature is the Lime-tree Walk (1714), leading up from the harbour. It is an active centre of trade and manufactures, the latter including whisky, ale, woollen yarn, glass, iron; there is some shipbuilding, and coal is exported from pits in the neighbourhood. The harbour is fair, having been greatly improved in 1863. The Forth is here crossed by a railway viaduct (1885), and there is steam-communication by the river with Edinburgh. Close by is Alloa House (1838), the seat of the Earl of Mar and Kellie, with Alloa Tower, 89 feet high, and built about 1223. Here Queen Mary spent part of her childhood, as also did James VI. and Prince Henry. Pop. (1841) 5443; (1911) 11,893; (1921) 12,421.

Allob'roges, a Celtic race of Gaul, whose territory lay between the Isère, the Lake of Geneva, and the Rhone, corresponding to the later Dauphiné and Savoy. Their chief town was Vienna (Vienne); their frontier town against the Helvetii, Geneva. First heard of as allies of Hannibal at the time of his invasion, 218 B.C., they were subjected to the Roman yoke in 121 by Quintus Fabius Maximus, thence called *Allobrogicus*, and from that time were governed as a part of Gallia Narbonensis. But they were civilised with difficulty, and were ever ready for rebellion.

Allocution, the address delivered by the pope at the College of Cardinals on any ecclesiastical or political circumstance. The Papal court generally makes use of it to guard a principle which it is compelled to give up in a particular case, or to reserve a claim for the future which has no chance of recognition in the present. Allocutions are published by being affixed to the doors of St Peter's.

Allo'dium, or ALLODIAL TENURE, has no well-defined general meaning in Law. It refers to a primitive form of land-tenure, which, both in Celtic and Teutonic communities, seems to have succeeded the original shifting allotment among the members of the tribe, the *sors* of the Burgundian law. The allod, udal, or duchas was an untaxed freehold held by custom or 'folk-right.' In Scandinavia its owner was the Holder, in Ireland the Brugaidh, in some parts of Germany the Bonder, in Kent the Gaveller. The allod was in some places inalienable, except in cases of starvation, and was not confiscated by the felony of the holder. Its most definite characteristic was freedom from the homage and other burdens which came in with the feud. Prior to feudalism, for instance, the land of France was either allodial or fiscal, under the official tenure of the *graphio*. The *franc alleu noble* was practically an allod conferred by a grant of *salica terra* or royal land. The extension of royal authority led to the system of benefices, and ultimately, under the influence of the Roman land doctrine of emphyteusis, to that of feus. Prior to the Conquest the land-tenure that existed in England was based on service and the comitatus of the king, and was therefore different from the developed Continental feudalism, of which the knight-service and the duties payable were the basis. But although the *bócland* of the Anglo-Saxons resembles the primitive allod, the latter had disappeared before the Norman Conquest. When the principal landholders of England surrendered their lands into the hands of the Conqueror at the council of Sarum, feudality was formally recognised, and it henceforth became a fundamental maxim in the law of real property that 'the king is the universal lord and original proprietor of all the lands in his kingdom, and that no man doth or can possess any part of it but what has mediately or immediately been derived as a gift from him, to be held upon feudal services' (Blackstone, vol. ii. p. 51, Kerr's edition). See FEUDALISM. This change was accomplished by private arrangements between the allodial proprietors and the prince, the former being anxious to exchange their nominal independence for the greater security enjoyed by the vassals of the sovereign, the latter being willing to receive them as dependants, for the sake either of their personal services in war, or latterly for the equivalents of these services, in money or the produce of the lands. The process by which an allodial owner put himself in a feudal relation to a lord is known as 'commendation.' In some countries feudality,

though general, was not universal; and allodial tenures consequently continued to subsist alongside of those originating with the crown. In this position was Denmark, and it is curious that the only examples of allodial tenures to be met with in Great Britain are the Udal rights in the islands of Orkney and Shetland, which formerly belonged to that country. These lands are generally held without written title, and entirely free from feudal services. By the law of Scotland, all property and superiorities belonging to the crown itself, and all churches, churchyards, manses, and glebes, the right to which is vested by the designation of the presbytery, are regarded as allodial. In the United States, although the word fee is in use, the feudal relation does not exist, and the title to land is essentially allodial. Every tenant in fee simple has a free and independent right of property in his land.

Allotments, small plots of land let to tenants for cultivation. The word is now generally applied to lands held by local authorities or other public bodies under the Allotments Acts for the purpose of letting in small parcels to the 'labouring population.' In 1790 the lord of a manor near Tewkesbury, observing that the occupants of certain cottages with a little land were marked by superior respectability, set apart 25 acres for the use of the poor; and in two years the poor-rates were reduced to 4d., as compared with 2s. 6d. to 5s. in surrounding parishes. In 1795 a select committee of the House of Commons reported favourably on the system, and in 1819 and in 1831 acts were passed for its extension; societies were also formed for the same object. The severe distress among the labourers, and the alarming rise of the rates under the old poor-law, forced the subject on the attention of landlords and legislature. Enclosure Acts provided that garden allotments should be reserved for the poor as compensation for the advantages lost to them through the enclosing of lands; but in 1868 it was proved by a government commission that 7,000,000 acres had been enclosed since 1760, with very scanty provision for the poor. From the General Enclosure Act of 1845 down to 1867, 484,893 acres were enclosed; and of this amount only 2119 acres were set aside for the poor. In 1882 an Allotments Act (known as Mr Jesse Collings' Act) was passed, which compelled trustees of charity lands to offer the land in allotments to the labouring class. Much has been done for the extension of the system by voluntary arrangement on the part of the landowners. In 1887 the Allotments Act was passed, which gave to local authorities compulsory powers for the acquisition of land for allotments. The powers conferred by that act were severely restricted; but these powers were gradually and very largely extended by the Allotments Act, 1890, the Local Government Act, 1894, and the Small Holdings and Allotments Act, 1907. These acts were revised and consolidated in the Small Holdings and Allotments Act, 1908, which is now the ruling statute. The necessary lands for allotments may be acquired by local authorities either by purchase or by hiring, and provision is made for land being hired or purchased either by agreement or by compulsion. If a local authority fail in its duty to provide allotments, the Board of Agriculture may transfer to a body, known as the Small Holdings Commissioners, the powers of the defaulting authority. Subletting of an allotment is forbidden. The holder of an allotment, on the expiry of his tenancy, has a right to compensation for improvements. The Board of Agriculture has issued 'Model Regulations' which are generally adopted. In view of the continued depopulation of rural districts, the decline of our agriculture, and the long-established divorce of the labourer from the land, the expediency of giving the worker a larger interest in the soil of the country is generally admitted; and it has been found that the allotment system, when wisely applied, is beneficial to all concerned. The size of allotments varies greatly in different parts of the country. It is not compulsory upon a council to provide allotments exceeding one acre in extent; and one person is not entitled to hold allotments acquired under the acts which exceed five acres in extent. The powers of the Board of Agriculture and of local authorities to provide lands for allotments and small holdings have been greatly extended by the Land Settlement (Facilities) Act, 1919. The Acquisition of Land (Assessment of Compensation) Act, 1919, which provides a tribunal and rules for the assessment of compensation in respect of land compulsorily acquired, applies to the deterioration of the amount of rent or compensation payable for land authorised to be seized compulsorily under the Small Holdings and Allotments Act, 1908.

In Scotland the Land Settlement (Scotland) Act, 1919, is one of a series of statutes providing facilities for the acquisition of land for allotments, and for the constitution and regulation of small holdings.

See LAND LAWS, PEASANT PROPRIETORSHIP, CROFTER.

Allotropy is the peculiarity, which certain elements exhibit, of existing in two or more distinct modifications, which, although chemically identical, usually differ very much in their physical properties, such as colour, density, hardness, and so forth.

The element carbon, which is a constituent of the very numerous chemical compounds commonly called organic bodies, is known in several allotropic modifications. Of these, two crystalline forms occur in nature—the first, the widely distributed but comparatively rare diamond; and the second, graphite or black-lead, familiar to all as the substance used in the manufacture of the so-called *lead* pencils. These two forms of carbon occur, as has been said above, crystallised—the diamond, in forms related to the cube, while graphite crystallises in thin hexagonal plates; and they thus present an example of what chemists call *dimorphism*, or the occurrence of the same substance in two totally distinct crystalline forms, which are not geometrically related to each other.

Besides the two crystalline forms of carbon found in nature in an almost pure state (graphite usually contains at least a small proportion of impurities), the various kinds of wood and animal charcoal, and coke, consist of carbon in a more or less pure state. These latter kinds of carbon are called *amorphous*, because they have not any definite crystalline form.

It is almost needless to point out the entire difference from each other in regard to colour, transparency, hardness, and other physical properties of the diamond and of graphite, diamond being, when quite pure, colourless and transparent, and the hardest of known substances; while graphite is black and opaque, and sufficiently soft to mark paper easily. That the various forms of carbon are chemically identical, is proved by burning any of them in oxygen, when in each case it is found that carbonic acid gas is produced and nothing else, and that exactly the same quantity of this gas is produced from equal weights of the various kinds.

In the case of many allotropic substances it is possible easily to convert one modification into another, but this is not markedly so in the case of carbon. When diamond is heated in the electric arc, out of contact with the air, it blackens and swells up into a somewhat coke-like mass. Many attempts have been made to prepare artificial diamonds from the more common kinds of carbon; and some measure of success has been attained by allowing carbon to separate, at a moderate tempera-

ture, from its solution in melted iron or silver, but the process is not remunerative.

Phosphorus presents another very good instance of allotropy. Several forms of this element have been described, but only two are commonly known. These are ordinary phosphorus, which is a pale yellow, semi-transparent, waxy solid, soluble in carbon bisulphide, and crystallising from this solution in octahedra; and red or amorphous phosphorus, usually seen in irregular lumps or in powder as a dark, reddish-brown solid, which is really a mixture of at least two distinct modifications of phosphorus. Ordinary phosphorus is very readily oxidised in the air, and must be preserved under water to prevent its taking fire, and it is extremely poisonous. The amorphous variety does not undergo any change in the air at ordinary temperature, and it is not poisonous. When ordinary phosphorus is melted in close vessels, and kept for a long time at a temperature near its boiling-point, a certain proportion of it is converted into red phosphorus. This change is accompanied by the evolution of heat, as can be easily demonstrated by suitable experiment. From the mixture obtained, the red phosphorus can be separated by dissolving out the unchanged ordinary kind by means of carbon bisulphide. When heated to a temperature somewhat higher than that at which it was prepared, amorphous phosphorus changes back again into the ordinary kind. Most persons are familiar with the appearance of ordinary phosphorus as such. The brownish surface provided on the boxes of safety matches for igniting these consists mainly of amorphous phosphorus.

Sulphur, again, is known in several allotropic forms, some crystalline and some amorphous, which differ greatly in colour, melting-point, solubility in solvents, &c. Most of these forms are, however, unstable, and quickly begin to change back again into ordinary sulphur. One of the most remarkable varieties is the so-called plastic sulphur, familiar to many as the clear yellow or brownish, pliable and elastic mass obtained by pouring melted sulphur, at or near its boiling-point, into water. This soft condition does not continue long, as in a few days the substance becomes opaque and hard, and passes, in great part, into the ordinary form of sulphur again. This change may be hastened by heating the plastic variety to near the melting-point of ordinary sulphur, when it suddenly becomes solid, giving out in doing so sufficient heat to raise its own temperature several degrees.

Another instance of allotropy, and one of great interest, is the existence of oxygen in two forms—as ordinary oxygen and as ozone. Both forms are gases—oxygen odourless, while ozone possesses a peculiar and powerful odour. Ozone is believed to be constantly present in small quantity in country and sea air, but its mode of formation in the atmosphere is not yet known with certainty. Ozone is formed when an electrical machine is worked, and also during many chemical processes, as in the slow oxidation of phosphorus in moist air. It is best prepared by passing what is known as the silent discharge of electricity through oxygen, by which means a considerable proportion of the oxygen is converted into ozone. Ozone is a much more active oxidising agent than oxygen, and the property is attributed to it of destroying deleterious organic impurities in the atmosphere.

The nature of the difference between allotropic forms of the same substance is, to some extent at least, understood in the case of oxygen; ozone being a condensed form of oxygen, and having a density half as great again as oxygen. Whilst the molecule of oxygen is represented by the formula O_2, that of ozone is represented by O_3. It is probable that an analogous explanation may be found to account for the formation of allotropic modifications of carbon, sulphur, phosphorus, &c.

Allotropy is nearly related to ISOMERISM, which see.

Alloway, Burns's birthplace, and the scene of his *Tam o' Shanter*, lies on the right bank of the 'bonny Doon,' 2 miles S. of the town of Ayr. The 'auld clay biggin,' in which the poet was born on 25th January 1759, was in 1880 converted into a Burns Museum. The 'haunted kirk' still stands, a roofless ruin, near the 'Auld Brig;' and hard by is the Burns Monument (1820).

Alloy. Compounds or mixtures which different metals form with one another are called *alloys*. There is an exception, however, in the case of mercury. When it is mixed with another metal, the compound is termed an *Amalgam* (q.v.). All alloys retain the essential properties of metals. They possess metallic lustre, and conduct heat and electricity well. On the other hand, when the metals form compounds with non-metallic elements, such as sulphur or chlorine, their general properties are quite changed. Alloys have been divided into three groups: (1) Those formed by the metals lead, tin, zinc, and cadmium, which impart to their alloys their own physical properties in the proportions in which they themselves are contained in the alloy. (2) Those formed by almost all other metals. Such alloys as belong to this group do not get imparted to them the physical properties of their constituent metals in the proportion in which they are present. (3) Those which contain metals found in both these groups of alloys.

In an alloy the specific Heat (q.v.) and the coefficient of expansion are always the means of those of its component metals. But in other physical properties a variation takes place. This is the case with specific gravity, which, in alloys of the first group, is the mean of their constituent metals; but in those of the second group, it is always greater or less than the mean specific gravity of their constituents. The increase in density indicates that the metals have contracted; in other words, that the metallic molecules have approached each other more closely; whilst the decrease in density denotes a separation of the molecules to greater distances from each other.

Again, in alloys of the first group, the conducting power for electricity is exactly proportional to the relative volumes of the component metals; while in alloys of the second group the case is different.

If lead, tin, zinc, or cadmium be mixed with any of the metals from which alloys in the second group are formed, this alloy has its coefficient of elasticity much increased. For example, coils of copper or silver wire are made straight by weights, by which a coil of brass or gun-metal wire will scarcely be altered in shape.

In some instances, when two melted metals are mixed together to form an alloy, an evolution of heat occurs, which is believed to indicate that a chemical compound has been formed. This is the case with copper and zinc, copper and aluminium, platinum and tin, &c. Many alloys, however, can be obtained in well-defined crystalline forms, which is usually considered a test of a definite chemical compound; yet a number of these—copper-zinc alloys, for example—crystallise in the same form, even when the proportions of the component metals vary considerably. Much has been learned in recent times by the study of polished and etched surfaces under the microscope.

A curious fact may be mentioned in regard to the solubility of alloys. Platinum by itself is quite insoluble in nitric acid, but if it be alloyed

with silver the compound is completely dissolved. Silver, on the other hand, readily dissolves in nitric acid, but it will not do so when mixed with a large quantity of gold.

The strength or cohesion of an alloy is generally greater than the mean cohesion of the metals contained therein, or even that of the most cohesive of its constituents. Thus, the breaking weight of a bar of copper or tin is very much lower than the breaking weight of a bar of the same size composed of certain alloys of tin and copper.

For alloys of iron (high-speed steels, stainless steel, &c.), see IRON AND STEEL, CHROMIUM, MOLYBDENUM, &c.

The most useful alloy in the arts is Brass (q.v.). This compound metal is next to iron in importance. Several kinds are made varying in composition from equal parts of copper and zinc, to five parts of copper with one of zinc. According to the proportions of these metals in the alloy it is called sheet-brass, Pinchbeck (q.v.), Dutch brass or Dutch Metal (q.v.), ordinary yellow brass, Muntz's metal or ship-sheathing brass, and so on.

There are some important alloys of copper and tin—among them Bronze (q.v.), Gun-metal (see CANNON), Bell-metal (see BELL), and Speculum Metal (q.v.). In these the proportions vary from equal parts of copper and tin, to ten parts of copper with one of tin. The most cohesive—that is, the strongest—of them is a bronze consisting of six parts of copper to one of tin. The addition of a little phosphorus to a bronze containing from 7 to 8 per cent. of tin gives it greater hardness, elasticity, and toughness. This alloy (phosphor-bronze) is much used for parts of machinery.

German Silver (q.v.) is an alloy composed, in its best quality, of two parts of zinc, four of copper, and one of nickel. Britannia Metal (q.v.) generally consists of about ninety-two parts of tin, eight of antimony, and two of copper. This is a softer metal than German silver, but both are largely manufactured into such objects as teapots, jugs, spoons, and the like, many of them being plated with silver. Nickel-copper alloys are used in the United States, Belgium, and Germany for coins.

Pewter is a tin alloy which was more used formerly than now. Its composition varies. Commonly, it consists of four parts of tin to one of lead, but sometimes it is tin with a little copper. Type metal (see TYPE) is an alloy of lead with antimony and some tin, but the proportions vary. Fusible metal melts at low temperatures; one kind is composed of three parts of tin, five of lead, and eight of bismuth, and melts in hot water. This alloy is now a good deal employed in stereotyping, and in obtaining copies of woodcuts. 'Albion metal,' which is largely used in some minor Birmingham manufactures, is an example of two metals combined by pressure, and therefore is not, strictly speaking, an alloy. It consists of tin laid on lead, the two metals being made to cohere by passing them between rollers. White, or anti-friction, metal, which has been much employed for certain kinds of machinery bearings, has in one variety a composition of eighty-five parts of tin, ten of antimony, and five of copper.

Aluminium-bronze (see ALUMINIUM), an alloy very closely resembling gold in appearance, which is much used for pencil-cases, chains, and some larger objects, varies in composition from ninety-five of copper and five of aluminium, to ninety of copper and ten of aluminium. A compound of silver and aluminium is sometimes used for watch-springs, and for spoons and forks. Dentists use a very ductile alloy composed of two parts by weight of silver and one of platinum. A metal formed of nine parts of platinum and one part of iridium was employed for the standard metre-measures by the Parisian commission for the international metrical system. An alloy of osmium and iridium, which is not attacked by acids, is used for tipping gold pens, and sometimes also for the bearings of the mariner's compass.

Sterling silver consists of 11 oz. 2 dwt. of silver and 18 dwt. of copper in the troy pound. That is, it contains 7·5 per cent. of copper. The Coinage Act of 1920 (10 Geo. V. chap. 3) reduced the standard fineness of silver coins from this proportion to 50 per cent. The proportion of *alloy* in gold coin and plate is also regulated by law. It is well to state that an assayer or bullion-dealer uses the term *alloy* in a different sense from what may be called its common meaning. He would say that standard silver contains 18 dwt. of *alloy* in the pound troy; but the more general, or at least, the more scientific, way is to call it an alloy of silver and copper. It is the same with gold. Pure silver is too soft to be used for anything which is to be much handled. A little copper imparts to it greater hardness and toughness, and makes it more easily fusible. The alloy used for English is said to wear better than that used for any foreign silver coin, although the difference in one or two cases is small.

When gold is to be used for coins, jewelry, or plate, it requires to be alloyed with copper or silver, or with both, in order to harden it. Like silver, it is too soft when pure. There are five legal standards in Great Britain for articles made of gold—i.e. alloyed gold, apart from coin. These are called 22, 18, 15, 12, and 9 carat gold. That is to say, these figures represent the number of parts of pure gold in every twenty-four parts of the alloy used by the goldsmith or jeweller. English sovereigns are made of a mixture of twenty-two parts gold to two of copper, and this is called 22-carat or standard gold. In Germany, Italy, and the United States, standard gold for the coinage is 21·6 carats. Gold jewelry usually contains both copper and silver, and, according to the proportion of the constituents, the objects have different shades of yellow.

In the United States, it is declared by law that the standard for both gold and silver coins shall be such, that of a thousand parts by weight, nine hundred shall be of pure metal, and one hundred of alloy. Formerly it was provided that the alloy of gold coins might be of either copper or silver; but now only copper is used in the alloy either of silver or gold coins.

All-Saints' Bay, in the province of Bahia, on the coast of Brazil, forms a superb natural harbour, in which the navies of the whole world might ride at anchor. Its length from N. to S. is 37 miles; its breadth from E. to W. 27. The town of Bahia (q.v.) lies just within it.

All-Saints' Day, in Old English All-Hallows, All-Hallowmas, or simply Hallowmas, a church festival, introduced because of the impossibility of keeping a separate day for every saint. As early as the 4th century, on the cessation of the persecution, the Sunday after Easter was appointed by the Greek Church for commemorating the martyrs generally; and in the Church of Rome a similar festival was introduced about 610, when the old heathen Pantheon (the present Rotonda, or Santa Maria dei Martiri) was consecrated on 13th March. But the real festival of All Saints was first regularly instituted by Gregory IV. in 835, on 1st November. The choice of the day was doubtless determined by the fact that November 1, or rather the *eve* or night preceding it, was one of the four great festivals (1st February, 1st May, 1st August, and 1st November) of the heathen

nations of the north; for it was the policy of the church to supplant heathen by Christian observances. See BELTANE and HALLOWEEN.

Allseed (*Radiola linoides*), a small weed of the family Linaceæ, found in damp, sandy places in Europe (including Britain) and North Africa. The minute tetramerous flowers have sepals cleft in three.

Allsop, THOMAS (1795–1880), a native of Derbyshire and London stockbroker, was the 'helpful friend' of Coleridge and Lamb, and a sympathiser with Feargus O'Connor and Orsini. He published *Letters, Correspondence, and Recollections of Coleridge.*

Allsopp, SAMUEL (1780–1838), a member of the great brewing establishment of Allsopp & Sons, Burton-on-Trent, was a descendant of an old family, and was noted for the charities of his public and private life. He was succeeded in the business by his sons, Charles James, William, and Henry (1811–87). To the last of these the modern development of the firm is largely due. He represented Worcestershire in parliament (1874–80), and in 1880 was created a baronet. After his retirement, he was raised to the peerage under the title of Lord Hindlip of Hindlip and Alsop-en-le-Dale. In 1887 the concern was converted into a limited company.

All Souls College. See OXFORD.

All-Souls' Day, a festival of the Roman Catholic Church, which falls on 2d November. The object of it is, by prayers and almsgiving to alleviate the sufferings of the souls in purgatory. It was first instituted in the monastery of Clugny, 993, and is said to have originated thus: A pilgrim returning from the Holy Land, was driven by a storm on a rocky island somewhere between Sicily and Thessalonica. Here he found a hermit, who told him that among the cliffs of the island was situated the opening into the nether world, through which huge flames ascended, and the groans and cries of souls tormented by evil angels were audible. The hermit had also frequently heard the complaints and imprecations of the devils, at the number of souls that were torn from them by the prayers and alms of the pious; they were especially enraged, he said, against the abbot and monks of Clugny. The pilgrim on his arrival acquainted Odilo, abbot of Clugny, with what had come to his knowledge, and the abbot thereupon appointed the day after All Saints to be kept in his monastery as an annual festival for 'All Souls.' The observance in a short time became general, without any ordinance at large on the subject.

Allspice. See PIMENTO, CALYCANTHUS.

Allston, WASHINGTON, an American painter, was born at Waccamaw, South Carolina, in 1779. He graduated at Harvard in 1800, and went next year to London to study art at the Royal Academy under Fuseli. From 1804 to 1809 he resided in Rome, studying the old masters and attaining some distinction; and there he formed an intimacy with Thorwaldsen and Coleridge. After a short stay in America (1809) he once more visited England, and in 1811 gained the 200-guinea prize of the British Institution. In 1817 he went to Paris, and the year after returned to America, and permanently fixed his residence at Cambridge Port, near Boston, where he lived, cultivating his art and the muses, till his death on 9th July 1843. In 1819 he had been elected a London A.R.A. His pictures are very numerous, the best being scriptural subjects. A composition of great size, 'Belshazzar's Feast,' occupied from time to time the last twenty-five years of his life, but was left unfinished. Allston's style is noble, his ideas are imaginative, and many of his paintings evince a true poetic spirit. In colouring, he imitated the Venetian school, and for this reason he has been styled 'the American Titian.' Coleridge said of Allston, that he was surpassed by no man of his age for artistic and poetic genius. He was author of a poem, *The Sylphs of the Seasons* (1813), the art-novel, *Monaldi* (1842), and *Lectures on Art* (ed. by Dana, 1850). See his Life by Flagg (1893).

All the Talents (MINISTRY OF). See GRENVILLE (WILLIAM WYNDHAM, LORD).

Alluvion takes place where soil is added to land by a river or by the sea by imperceptible degrees. *Alluvio* in Roman law was a recognised mode of acquiring ownership, the effect being that the owner of the land to which such increment was made became owner of the increment. It was distinguished from *avulsio*, which takes place where a portion of ground is, by a sudden and violent flood, carried away from one man's land to another man's land; for in this case the ground so torn away remains in the ownership of the former proprietor. In English and Scots law these rules of Roman law are generally followed. In England land gained from the sea by gradual silting up, so as in time to make it *terra firma*, belongs to the owner of the adjoining land; but if the increment be sudden and considerable it belongs to the crown. In Scotland ground gradually silted up by the sea becomes the property of the owner of the adjoining land if, under his title or as a matter of fact, the boundary of his land is the sea or the flood-mark. In the United States an increment of soil on the shore of the sea or on the bank of a river, if gradually and imperceptibly made, goes to the owner of the land adjoining, in accordance with the principles of the Roman and English law.

Alluvium, a term originally applied to those deposits which were supposed to have been formed subsequently to the Flood, while Diluvium (q.v.) included the strata produced by it. In modern geological classification, these two terms have ceased to be used in this sense. By alluvium is now meant any earthy material deposited by the ordinary operation of water in motion. Hence it includes the mud, silt, sand, and gravel brought down by streams and rivers, and spread over lower lands, where it frequently forms flats and terraces. Some geologists extend the term to those wide accumulations of silt and mud which are formed in the upper reaches of estuaries, and laid bare at low tide. These are spoken of as *marine alluvium.* See DELTA, DENUDATION.

Allygurh. See ALIGARH.

Allyl (Lat. *allium*, 'garlic') is an organic radical, represented when in combination by C_3H_5, and when in the free state by C_6H_{10}. The properties of some of its most important compounds are described in the article GARLIC (OIL OF).

Alma, a river in the Crimea, rising at the foot of the Tchadir Dagh, and flowing westward into the Bay of Kalamita, about half-way between Eupatoria and Sebastopol. On the steep banks of this stream, through the channel of which the British troops waded amidst a shower of bullets, a brilliant victory was won on the 20th of September 1854, by the allied armies of Britain and France, under Lord Raglan and Marshal St Arnaud, over the Russian army commanded by Prince Menschikoff. It was the first battle of the Crimean war.

Almacantar, a name for circles of altitude parallel to the horizon, and hence for an astronomical instrument for determining time and latitude. The almacantar consists of a telescope revolving on a horizontal axis, which can be clamped at any altitude, the whole resting on a float sustained in a trough of mercury. The clamped telescope, when its floating support is

turned, will therefore trace out a circle of equal altitude, and by the transits of stars across this circle, time and latitude can be obtained with very great accuracy. It can also be used for determining the apparent places of the heavenly bodies.

Almack's, a suite of assembly-rooms in King Street, St James's. They were built in 1765 by Almack, a tavern-keeper; but for a century (they were closed in 1890) they were known as Willis's Rooms, from the name of Almack's heir. The name is chiefly associated with the balls that, from the opening of the rooms till about 1840, were held there under the management of a committee of ladies of high rank; and the circle having admission to the balls at Almack's was at the beginning of the century regarded as the seventh heaven of the fashionable world. Willis's Rooms were also used for dinners and concerts. Almack seems to have been a Highlander called MacCaul or M'All, who transposed his name when he came to London as valet to a nobleman. Almack's *Club* (1764), where high play was indulged in, became Brooks's in 1778. See *Notes and Queries* for 1891. Almack died in 1781, leaving a large fortune to his family.

Alma'da, a town of Portugal, in Estremadura, on a height opposite Lisbon; pop. 7000.

Almadén, or ALMADÉN DEL AZOGUE ('the Mines of Quicksilver'), a town in Spain, 50 miles SW. of Ciudad Real, in the chain of the Sierra Morena; pop. 10,000. Its rich quicksilver-mines, in twelve galleries one below the other, yield hundreds of tons annually. The present mines, which have been carried to a depth of 1200 feet, date from the 17th century; but quicksilver was largely worked here by the Romans in the time of Pliny. Crown property, they were rented by the Fuggers of Augsburg (1525–1645), and by the Rothschilds in the 19th century. Both cinnabar and native mercury occur.—NEW ALMADEN, in the Coast Range, California, 12 miles from San José, was first worked regularly for mercury in 1845, and used to yield as much as 2,000,000 lb. a year.

Al'magest, the name given by the Arabs to the great work of the astronomer Ptolemy (q.v.).

Alma'gro, a town of New Castile, Spain, 13 miles ESE. of Ciudad Real. It has a great manufacture of lace. Pop. 9000.

Almagro, DIEGO DE, a Spanish *conquistador*, was born in 1464 or 1475, and was a foundling who derived his name from the town near which he was found. After serving in the army, he sailed to seek his fortune in the New World, where he amassed considerable wealth by plunder, and became one of the leading members of the young colony of Darien. In 1522 he formed, with Pizarro, the design of conquering Peru—an undertaking crowned ten years afterwards with marvellous success. Receiving permission from the Spanish court to conquer for himself a special province south of Pizarro's territory, he marched on Chile in 1536, penetrated as far as the Coquimbo, and returned in 1537, just when the Peruvians had flown to arms and shut up the Spaniards in Cuzco and Lima. As these towns lay south of Pizarro's district, they were claimed by Almagro. He dispersed the Peruvian army before Cuzco, and advanced against Lima, hoping to make himself sole master of the country. But on the 6th April 1538, he was defeated in a desperate engagement with the Spaniards under Pizarro near Cuzco; and on the 26th, he was strangled in prison, and his corpse beheaded in the market-place of Cuzco. His half-caste son, Diego, collecting some hundreds of his father's followers, stormed Pizarro's palace, and slew him (1541); then proclaimed himself captain-general of Peru; but, defeated in the bloody battle of Chupas (16th September 1542), he was executed along with forty of his companions.

Almali'. See ELMALI.

Alma Mater (Lat., 'nourishing mother') is a name given to a university in relation to those who have derived instruction from it. The word *alma* ('nourishing,' 'kindly') was applied by the Latin authors to such of the deities as were friendly to men—Ceres, Venus, &c.—and also to the earth, the light, the day, wine, and the soil.

Al'manac, a word applied in Roger Bacon's *Opus Majus* (1267) to permanent tables showing the apparent movements of the heavenly bodies. It is the Italian *almanacco* (about 1345), the French *almanach*, and the Spanish *almanaque*, the immediate source of all which, according to Sir J. Murray, was apparently a Spanish-Arabic *al-manākh;* an Arabic-Castilian vocabulary (1505) giving *manākh*, 'a calendar,' and *manah*, 'a sun-dial.' Further than this one cannot go, though attempts have been made to explain *manākh* from Semitic sources, and to connect it with the Latin *manacus* (properly *mēnœus*), 'a sun-dial,' of Vitruvius, or with the *almenichiaka* (in Eusebius, quoting Porphyrius), an Egyptian word signifying 'daily observation of things.' The *Fasti* (q.v.) of the Romans came nearer to our modern almanacs than the 'almanacs' known to Roger Bacon and Chaucer, for it was not till the 15th century that almanacs or *ephemerides* were prepared for definite periods, such as fifty or ten years; nor till the 16th for a single year. Thus, the earliest printed almanac was that *Pro pluribus annis*, published at Vienna in 1457 by the celebrated astronomer Purbach; whilst that printed at Nuremberg in 1473, by his pupil Regiomontanus, was for the thirty years from 1475 to 1506. The printer Engel of Vienna commenced the publication of an almanac in 1491; and Stöfler of Tübingen, in 1524. Copies of these are now very rare. In 1533 Rabelais published, at Lyons, his almanac for that year, and renewed the publication in 1535, 1548, and 1550. The fame and popularity of the celebrated astrologer, Nostradamus (q.v.), gave such an impulse to the publication of predictions, that, in 1579, Henry III. of France prohibited the insertion of any political prophecies in almanacs—a prohibition renewed by Louis XIII. in 1628. Before this, in the reign of Charles IX., a royal *ordonnance* required every almanac to be stamped with the approval of the diocesan bishop.

Prophetic almanacs still circulate to an incredible extent in France, in the rural districts and among the uneducated. The most popular of all these is the *Almanach Liégeois*, a venerable remnant of superstition. It was first published at Liége in 1625, and ascribed to Matthieu Laensbergh, whose existence at any time seems very problematical. The *Almanach Liégeois* was a most convenient one for the illiterate, since by certain symbols attached to certain dates, the most unlettered persons could follow its instructions: thus the rude representation of a phial announced the proper phase of the moon under which a draught of medicine should be taken; a pill-box designated the planet most propitious for pills; a pair of scissors pointed out the proper period for cutting hair, a lancet for letting blood. Of course, amidst innumerable predictions, some may naturally be expected to come to pass. So in 1774, this almanac predicted that in the April of that year a royal favourite would play her last part. Madame Dubarry took the prediction to herself, and repeatedly exclaimed: 'I wish this villanous month of April were over.' In May Louis XV. died, and Madame Dubarry's last part was really played. The credit of old Matthieu was established more firmly than ever. In 1852 a number of

commissioners, appointed by M. Maupas, minister of police, having examined between 7000 and 8000 of the national chapbooks, which included a great number of almanacs, pronounced them so deleterious, that it became necessary forcibly to check their circulation.

In England, so far was any restraint from being put upon the publication of prophetic almanacs, or 'Prognostications,' as they were usually called, that James I. gave a monopoly of the trade to the two Universities and the Stationers' Company, under whose patronage, and with the *imprimatur* of the Archbishop of Canterbury, flourished such productions as Lilly's *Merlini Ephemeris* (1644–81), *Poor Robin's Almanac* (1664–1824), and *Moore's Almanac*, under the editorship of *Henry Andrews*, which reached an annual sale of more than half a million (1743–1820); yet 'it would be difficult to find, in so small a compass, an equal quantity of ignorance, profligacy, and imposture, as was condensed in these publications.' The memory of Partridge, from 1678 to 1713 the prophet of the Stationers' Company, is preserved in Pope's *Rape of the Lock*, and in Swift's lively burlesque, in which the prophet's own death was predicted. In 1775 a decision of the Court of Common Pleas, in favour of a bookseller named Carnan, abolished the monopoly of the Stationers' Company. In 1779 Lord North brought in a bill renewing their privileges. After a powerful speech against the measure by Erskine, who exposed the pernicious influence of the productions published under the monopoly, it was rejected. The Stationers' Company, however, still maintained their ground by buying up all rival almanacs; and it was not until the publication, in 1828, of the *British Almanac* by the Society for the Diffusion of Useful Knowledge, that the eyes of the English public became opened to the irrational and deleterious nature of the commodity which their own indifference or folly, as much as the selfishness of their purveyors, had hitherto maintained in existence. The success of this admirable publication stimulated the Stationers' Company to publish the *Englishman's Almanac*. The *British Almanac* from 1870 to 1914 was the principal almanac published by the Stationers' Company. *Whitaker's Almanack* is a valuable compendium of information, started in 1869, and now extending, with supplement, to over 1000 pages.

In Scotland the earliest almanacs seem to have been produced about the beginning of the 16th century. Shortly after the beginning of the 17th century, the almanacs or 'prognostications' published at Aberdeen had begun to enjoy a celebrity which is hardly yet extinct. About 1677 they were sold for a *plack* each; and the annual circulation amounted, on an average, to 50,000 copies. In 1683 appeared a rival publication, under the title of *Edinburgh's True Almanack, or a New Prognostication*. For a long time the Scottish almanacs continued, like all others of that age, to contain little besides a calendar, with a list of fairs, and—what constituted the great attraction—predictions of the weather. But something more instructive and comprehensive became requisite, and the *Edinburgh Almanac* seems to have been among the first to respond to this requirement of advancing civilisation; for, by various additions, such as a list of Scottish members of parliament, it had, in 1745, been extended from the original 16 pages to 36. In twelve years from that date, it had swelled to 72 pages; in 1779 it had reached 252 pages. Since 1837 it has been published under the title of *Oliver & Boyd's New Edinburgh Almanac*, and now extends, with supplements, to some 2400 pages. It contains a vast amount of information on public matters, especially on those connected with Scotland. What 'O. and B.' is to Scotland, is *Thom's Irish Almanac* (1843) to Ireland—a work not less excellent, and even more extensive.

Of important national almanacs are the French *Almanach Royal*, afterwards *Impérial*, now *National*, begun in 1679, a bulky octavo volume, full of useful information; and the *American Almanac and Treasury of Fact*, started in 1878. The earliest American almanac was published by William Bradford, at Philadelphia, in 1687. Franklin's *Poor Richard's Almanac* (1732–57) may be noticed.

The *Almanach de Gotha*, published annually at Gotha by the great geographical house of Justus Perthes, has a European, or rather a cosmopolitan character. It was begun in 1764, in the German language, in which it was continued until Napoleon I. became emperor, when it was changed to the French language; since the Franco-German war of 1871 it has been published in both tongues. The almanac is a small pocket volume, containing some 1500 pages of small type, and recording the sovereigns and presidents, and the present or late royal, mediatised, and noble families, of every civilised country, with the civil, diplomatic, military, and naval officers, a great amount of statistical information, compact summaries of constitutions, of international organisations, and other matters of political interest. No book ever printed contains so much political and statistical information in so small a compass. The extent, population, commerce, shipping, and revenues, expenditures, and debts of states are given, the names of all the diplomatic representatives and *attachés* of the world, the organisation of armies and navies in peace and in war. When the *Almanach de Gotha* was commenced, there was but one republic in existence—that of Switzerland, and it was then little more than a register of the crowned heads and royal families of Europe. Mention was first made of the more important Asiatic dynasties only in 1922. It has been slow to recognise political changes. During the Empire, Napoleon I. considered this little publication so important that he exercised over it a rigid supervision, and in 1808 an entire edition, which had just been worked off, was seized because Anhalt took precedence of Bonaparte. To secure this rearrangement of the alphabet, the edition of that year was printed at Paris. In modern times, however, almanacs have developed into year-books, which concentrate on statistics. Among these the *Statesman's Yearbook*, 'a statistical and historical annual of the states of the world' (first published 1864), holds an exceptionally high place. Many religious bodies, trade organisations, literary institutions, &c. issue year-books of their own.

The most important astronomical almanac published in Britain is the *Nautical Almanac*, projected by the astronomer royal, Dr Maskelyne, and first published, with the authority of government, for 1767. After his death it gradually lost its character, and in 1830, in consequence of the numerous complaints made against it, the government requested the Astronomical Society to pronounce upon the subject. The suggestions of the Society were adopted, and in 1834 the first number of the new series appeared, with such additions and improvements as the advanced state of astronomical science rendered necessary. It is issued four years in advance of the year to which it refers. Still older than this almanac is the French *Connoissance des Temps*, commenced in 1679 by Picard, and now published under the authority of the *Bureau des Longitudes*. Its plan resembles that of the *Nautical Almanac*, but it contains a larger amount of original memoirs, many of them of great value. Similar works are the *Berliner Astronomisches*

Jahrbuch (1776), from 1830 till 1862 edited by Encke, and the *American Nautical Almanac* (1855).

Another kind of almanac, which has especially flourished in Germany and France, belongs rather to the class of publications known in Britain as *Annuals* (q.v.). Such have been the *Almanach des Muses, des Dames, Populaire, Icarien, Napoléonien*, &c., the latter of which were specially devoted to the interests of political and religious parties.

The heavy stamp-duty of fifteenpence per copy, to which almanacs were long liable in the United Kingdom, was abolished in 1834, since which time the character, number, and circulation of this class of publications have strikingly advanced.

See CALENDAR, CLOG ALMANAC; a series of articles in *Notes and Queries* (1885); N. Champion's *Anciens Almanachs Illustrés* (1885); Whitworth's *Churchman's Almanac from 1201 to 2000* (1883); E. F. Bosanquet, *English Printed Almanacs and Prognostications* (1917).

Almandine. See GARNETS; also CARBUNCLE.

Almansa, a town of Spain, in the province of Albacete, 60 miles NW. of Alicante by rail. There is a ruined Moorish castle. An obelisk, about a mile distant, marks the spot where the French, under the Duke of Berwick, gained an important victory, on 25th April 1707, over an army of Spanish and English troops. Pop. 12,500.

Almansur ('the victorious'), the title assumed by Hashem II.'s general, Mohammed ben Abdallah (see KHALIF), and by Abu-Jafar, the second Abbasides Khalif (q.v.), who succeeded his brother in 754. Warfare, treachery, murder were his steps to the throne, and his whole rule was as cruel as its beginning. He especially persecuted the Christians in Syria and Egypt. In war against external foes he had but little success, Spain and Africa falling away from the eastern khalifate. He removed the seat of government from Kufa to Baghdad, which he built (764) at immense cost, raising the money by oppressive taxation. He introduced the pernicious custom of making his freed slaves, mostly foreigners, rulers of provinces. The best feature in his character was his patronage of learning. He caused the *Elements* of Euclid to be translated from the Syriac, and the famous fables of Bidpai from the Persian. Almansur died in 775 during a pilgrimage to Mecca, at the age of almost 70. See Nöldeke's *Sketches from Eastern History* (1893).

Alma-Tad'ema, SIR LAWRENCE, R.A., painter, was born, a notary's son, at Dronryp, in the Netherlands, 8th January 1836. Originally destined for the medical profession, it was not until 1852 that he devoted himself to the study of art. In that year he entered the Academy of Antwerp, and subsequently studied under Baron Henry Leys. Obtaining letters of naturalisation as a British subject, he settled permanently in England in 1873. Early in life he had deeply studied Egyptian archæology and Greco-Roman art, and the results of his oriental investigations are strongly apparent in his works, which are distinguished for their careful composition, their accuracy of design, and the beauty, sobriety, and finish of their colouring. The following works may be cited as perhaps best embodying his æsthetic principles and the general characteristics of his art: 'Entrance to a Roman Theatre' (1866); 'Tarquinius Superbus' (1867); 'A Roman Amateur' (1868); 'Pyrrhic Dance' (1869); 'The Vintage' (1870); 'A Roman Emperor' (1871); 'The Mummy' (1872); 'A Picture Gallery' (1874); 'After the Dance' (1876); 'The Seasons' (1877); 'A Sculptor's Model'—Venus Esquilina (1879); 'The Way to the Temple'—the artist's diploma work for the Royal Academy (1883); 'The Emperor Hadrian visiting a British Pottery' (1884); 'An Apodyterium' (1886); and 'The Women of Amphissa' (1887). In 1876 Alma-Tadema exhibited at the Grosvenor Gallery three pictures, 'Architecture,' 'Sculpture,' and 'Painting.' 'The Conversion of Paula by St Jerome' (1898) was a masterpiece, and some of his portraits are noteworthy. Elected A.R.A. (1876), R.A. (1879), he was knighted in 1899, received the O.M. in 1905, and other orders. He died 25th June 1912. His second wife LAURA EPPS (1852–1909) and his daughter ANNA are known as artists; another daughter (LAURENCE) has written novels and poems. There are books on him and his art by Ebers (1885), Miss Zimmern (1902), P. C. Standing (1905), and R. Dircks (1910).

Almeh, ALME, or ALMAI (Arabic *'âlim*, 'wise,' 'learned'), one of a class of Egyptian singing girls in attendance at festivals, entertainments, or funerals. The Ghawazi, or dancing girls, are of a lower order.

Almei'da, one of the strongest fortified places in Portugal, is situated on the river Coa, on the Spanish frontier, in the province of Beira. In 1762 it was captured by the Spaniards, but soon restored. In 1810 it was defended against Marshal Masséna by an English officer, until the explosion of a powder-magazine compelled him to capitulate.

Almeida, DON FRANCESCO DE, a famous Portuguese viceroy of the Indies, was the seventh son of the Count of Abrantes, and first distinguished himself in the wars with the Moors, but especially at the conquest of Granada in 1492. In 1505 his sovereign, Emanuel I., appointed him viceroy of the Portuguese possessions in the East Indies. On the voyage thither he deposed the king of Quiloa on the Mozambique coast, and, proceeding to Zanzibar, destroyed the town of Mombasa. In the Indian seas he asserted everywhere the superiority of the Portuguese flag, and strove to exclude the Egyptians and Venetians from all commerce with the East. At Cananor, Cochin, Ceylon, and Sumatra, he either built fortresses to protect the factories and commercial interests of his nation, or established new factories. With the king of Malacca, a commercial treaty was formed about the same time. His son, Lorenzo, carried on several expeditions as his father's lieutenant, visited Ceylon, discovered the Maldive Islands and Madagascar, but soon after was surprised and killed in the port of Chaul, near Bombay. His father speedily took measures to revenge the death of his son upon the hated Mussulmans, when Affonso d'Albuquerque appeared on the scene (1507), having been sent out by the Portuguese government to supersede Almeida, whom it had begun to distrust on account of his brilliant successes. The latter refused to recognise Albuquerque as viceroy, and for some months kept him prisoner at Cochin. He now sailed along the coasts, burning and plundering various seaports, amongst others Goa, and at length utterly destroyed the Moslem fleet at Diu. From this fierce and avenging expedition he returned to Cochin, resigned his office into the hands of his successor, and set out on his homeward voyage. But he was slain in an obscure affray with savages on the site now occupied by Cape Town, 1st March 1510.

Almeida Garrett, JOÃO BAPTISTA DA (1799–1854). See PORTUGAL (*Literature*), p. 323.

Almelo, a town of Holland in Overyssel, 25 miles ESE. of Zwolle, with a fine church and manufactures of linens; pop. 24,500.

Almería (Arabic *Al-Mariyat*, 'the conspicuous'), the chief town of a Spanish province on the Gulf of Almería, on the Mediterranean, 120 miles E. of Málaga. It is surrounded by high walls extending from the sea to the hill, has a well-defended harbour, a cathedral, numerous churches and monasteries, and a grammar-school. In the

time of the Moors it was, next to Granada, the richest and most important town in the kingdom, with about 150,000 inhabitants, and flourished alike in arts, industry, and commerce, being the great port of traffic with Italy and the East. At one time it was as terrible a nest of pirates as Algiers itself, under the Moorish chief Ibn Mayman, when even Granada, according to the proverb, was merely its 'farm.' Now, it has only a few trifling manufactures, although it still keeps up considerable trade in grapes, esparto, lead, iron-ore, sulphur, and wine. Its grapes are peculiarly suitable for exportation. The much-needed railway from Linares was not completed till 1894. Pop. 50,000.—The province of Almería consists of the eastern portion of the ancient kingdom of Granada, and has an area of 3400 sq. m. The soil is fertile, but the province is not very prosperous. There are rich mines in the sierras, yielding copper, iron, mercury, silver, and lead. Pop. 360,000.

Almodóvar del Campo, a town of New Castile, Spain, 22 miles SW. of Ciudad Real. The inhabitants are chiefly employed in agriculture and silver-mining. Pop. 12,600.

Almohades, the name of a Moslem dynasty that ruled in Africa and Spain during the 12th and 13th centuries. The word is Arabic, signifying 'worshippers of the one true God,' and was assumed as a term of distinction. This sect, which at first was religious rather than political, was founded among the Atlas Mountains by Ibn Tomrul Abdallah, and in 1146, under the leadership of Abd-ul-Mumen, put an end by the conquest of Morocco to the empire of the Almoravides in Africa, and next extended its career of conquest to Spain. Under Jakub Almansor they won in 1195, at Alarcos, a great victory over the Castilians. In 1210 Mohammed, the successor of Jakub, came with a great army to Spain, but was overthrown in 1212 by the united kings of Castile, Aragon, and Navarre, in the famous battle of Navas de Tolosa, in which it is said that 100,000 Moors were left upon the field. This great defeat was the beginning of the downfall of Moorish power in Spain; its most immediate result was the disappearance of the Almohades from the peninsula. The empire of the Almohades in Africa was brought to an end in 1269, through revolts of the nomadic tribes. See ALMORAVIDES; and Dozy's edition of the History of Abd-ul-Wahid (1847, 2d ed. 1881).

Almond, the name of two small rivers of Scotland, one of which, since 1920 the western boundary of Edinburgh, falls into the Firth of Forth at Cramond; the other into the Tay above Perth.

Almond (*Prunus Amygdălus*), a fruit-tree of

The Almond:
a, flower; *b*, fruit.

the same genus as the Peach (q.v.) and Plum (q.v.). While in these the drupe has a fleshy covering, in the almond it has a dry fibrous husk, which shrivels as the fruit ripens, and finally opens of its own accord. The almond-tree is very similar to the peach-tree, and is about 20–30 feet high, a native of the East and of Africa, but has now become completely wild in the whole south of Europe. Even in the more northern parts of Germany and of Britain it is planted for the sake of its beautiful flowers, which are produced in great abundance, and resemble those of the peach in form and often in colour, although generally paler and sometimes white. The blossoms appear before the leaves, and are very ornamental in shrubberies in March and April. The wood of the almond-tree is hard, and of a reddish colour, and is used by cabinet-makers. But it is chiefly valued on account of the kernel of its fruit, which forms an important article of commerce. The almond-tree is often referred to in the Old Testament, and the word translated *hazel* is supposed to be another name for the almond. The tree flowers in Palestine in January. The rod of Aaron, mentioned in Numbers xvii., was taken from an almond-tree, and it is yet customary with the Jews to carry rods of almond-blossom to the synagogue on festival days. It seems to have been very early introduced into England, and is named in the *Durham Glossary* (11th century) the 'Easterne Nutte-Beam.' Its great beauty has made it a favourite with every one wherever it can be successfully grown. Gerard, in Shakespeare's days, says the trees were 'in our London gardens in great plenty;' but Marlowe and Spenser had sung of its beauty before that time. It is only in the most favoured situations in the south of England that it ever produces good fruit.—Almonds are either sweet or bitter. The bitter appear to be the original kind, and the sweet to be an accidental variety, perpetuated and improved by cultivation. Sweet almonds contain a large quantity of a very bland, fixed oil, emulsin, gum, and mucilage sugar, are of a very agreeable taste, and very nutritious, and are used in the dessert, in confectionery, and medicinally in an emulsion, which forms a pleasant, cooling, diluent drink. Bitter almonds contain the same substances, and, in addition, a substance called *Amygdalin* (q.v.), from which is obtained a peculiar volatile oil. (For the almond *oils*, see the following articles.)—The muddy water of the Nile is clarified by rubbing bitter almonds on the sides of the water-vessels, in the same way in which the nuts of the *Strychnos potatorum* (see CLEARING NUT) are used in India. The principal varieties of almond in cultivation are the *sweet* almond, with thick hard shell; the *brittle-shelled*, with a very thin, almost leathery brittle shell and sweet kernels; the *bitter*, with thick hard shell (sometimes also with a brittle shell) and bitter kernels; the *large-fruited*, with large flowers of a whitish rose-colour, and very large, sweet fruit; the *small-fruited*, with very small, sweet fruit; and the *peach* almond, with a slightly succulent blackish *sarcocarp*, yellow shell, and sweet kernels. In commerce, the long almonds of Málaga, known as Jordan almonds, and the broad almonds of Valencia, are most valued. Large quantities of almonds are annually imported into Britain and America from France, Spain, Italy, and the Levant; and California produces many. Bitter almonds are brought to Britain chiefly from Mogador.—The DWARF ALMOND (*Prunus nana*) is very similar to the common almond, except that it is a low shrub, seldom more than two or three feet in height. Its fruit is also similar, but much smaller. It is common in the plains of the south of Russia, and is frequently planted as an ornamental shrub in Britain, flowering freely in March and April, but not producing fruit.

Almondbury, a SE. part of Huddersfield (q.v.).

Almonds, Fixed Oil of. When almonds are subjected to pressure, a fixed greasy oil exudes. Either bitter or sweet almonds may be employed; but the former are generally used, as they are cheaper than sweet almonds, and the cake which is left is valuable in the preparation of the *essential oil*. 1 cwt. of the almonds generally yields 48 to 52 lb. of the fixed oil. When first obtained it possesses a turbid or milky appearance; but when it is allowed to stand at rest the impurities settle, and a clear, light, yellow oil remains above. It has the specific gravity of ·920, and does not solidify till it is cooled to between + 14° and − 5° F. (− 10° and − 20° C.). When fresh it has a mild nutty taste, but soon becomes rancid by exposure to the air; it is not, however, one of the drying oils. It consists almost wholly of *triolein*, a compound of glycerine with oleic acid. The fixed oil of almonds possesses a mild laxative property, and is beneficial also in allaying troublesome coughs, and applied externally is used in the form of cold creams for chapped hands, &c.

Almonds, Volatile Oil or Essential Oil of. The cake which is left after the expression of the fixed oil from bitter almonds contains, among other matters, a portion of two substances called respectively amygdalin and emulsin. When the cake is bruised and made into a paste with water, the emulsin acts as a ferment upon the amygdalin, splitting it up into the volatile oil of almonds, hydrocyanic (prussic) acid, grape-sugar, and water. The oil is not originally present in the bitter almonds; in fact, the latter do not contain a trace of the oil ready formed, so that the oil is purely the product of the fermentation of amygdalin, 100 parts of which yield 47 of crude oil. This action takes place very rapidly, and is complete within 24 hours. The crude oil thus obtained decomposes gradually, the prussic acid being set free, and on this account it is very poisonous, many fatal cases having occurred from its wilful, accidental, or careless use. The crude oil is purified and freed from prussic acid by means of sulphate of iron and lime. On redistillation it has a specific gravity of 1·049, as compared with 1·064 in the crude state, and must be carefully freed from water by being shaken with fused chloride of calcium. The yield of crude essential oil is very variable, ranging from 4 to 9½ lb. from 1000 lb. of bitter almonds, and this again is reduced by about 10 per cent. during its purification from prussic acid. The volatile oil (C_6H_5COH) is the aldehyde of benzoic acid (C_6H_5COOH), into which substance it rapidly changes when exposed to the air in a moist state. It has an agreeable odour, an acrid, bitter taste, and burns with a smoky white flame. It is soluble to the extent of 1 part in 30 parts of water, and is very soluble in alcohol and ether. Heated to 356° F. (180° C.), it boils, and distils over unaltered. At the present time 'benzaldehyde' or synthetic oil of bitter almonds is largely used, and has an advantage in its freedom from prussic acid. The benzaldehyde is made from toluene (C_7H_8). In medicine the crude oil used to be employed in place of prussic acid, but its variability in strength has led to its disuse for this purpose. The cook and confectioner employ the oil for flavouring custards, &c., and it forms the basis of several flavouring essences, as ratafia. For these purposes none but oil freed from prussic acid must be used. Synthetic oil is used for perfuming soaps. Much of the bitter almond oil of commerce is made from peach and apricot kernels.

Almoner, that functionary of a religious house who had the dispensing of the money and other things set apart for alms, which must, by canon law, amount to at least a tenth of the revenues of the establishment. Afterwards, those ecclesiastics also received this name who were appointed by princes or bishops to the same office in their households. The Grand Almoner of France was one of the principal officers of the court and of the kingdom, usually a cardinal. Queens, princes, and princesses had also their almoners, and bishops were usually appointed to this office. In England, the office of *Hereditary Grand Almoner* is now a sinecure, his only duty being to distribute the coronation medals among the assembled spectators. The *Lord High Almoner*, who is usually a bishop, distributes twice a year the royal bounty, which consists in giving a silver penny apiece to as many poor persons as the sovereign is years of age.

Almo'ra, the principal town of the British district of Kumaun (q.v.), United Provinces of India, 87 miles north from Bareilly, on the crest of a ridge of the Himalayas, 5337 feet above the sea. It was an important centre in the Gurkha war of 1815. Pop. 8000.

Almoravides (Arabic *al murabitun*, from the *rabita* cell or hermitage where they first assembled), name of an Arab dynasty that ruled in Africa and Spain in the 11th and 12th centuries A.D. The sect took its rise about the middle of the 11th century among the Arab and Berber tribes which dwelt on the slopes of the Atlas range facing the Atlantic, and was founded by a Moslem teacher called Abdallah-ben-Yasin. The new proselytes soon exhibited the fruits of his teaching by descending from their hills, under the leadership of a chief named Abubekr, and conquering the kingdom of Fez. The adjoining kingdom of Morocco shared the same fate; and the victorious fanatics, under the famous Yussuf-ben-Tasfin, the cousin of Abubekr, next crossed the Strait of Gibraltar, and subdued Spain to the Tagus on one side, and to the Ebro on the other. During the reign of Ali, the son of Yussuf, the Almoravides fell before the sect of the Almohades (q.v.), which first expelled them from Africa, and next subdued their power in Spain. It was the Almoravide princes who introduced the *Maravedi* (q.v.) into Spain, and in that and the word *Marabouts* (q.v.) their name is still preserved. See Dozy, *Histoire des Musulmans d'Espagne* (4 vols. 1861).

Almqvist, Karl Jonas Ludvig, a Swedish author, was born at Stockholm in 1793, and died in 1866 at Bremen, after a singular career, in which, after taking priest's orders he was charged with heresy. Later, though apparently innocent, he had to flee as a suspected forger and would-be assassin to America, where, under an assumed name, he became Abraham Lincoln's secretary. His works, a selection from which fills 4 vols. (1875), included his masterpiece, *Törnrosens Bok*, and other poems, besides novels, plays, and historical, critical, and philosophical writings, some of the latter socialistic in tone. Almqvist belongs very markedly to the romantic school. An English translation of *Sara Videbeck* appeared in 1920.

Almshouse. An almshouse is a house or set of houses in which accommodation is provided for persons disabled by age and poverty. Great abuses formerly prevailed in some of these institutions. In some, persons of good position were received, and the intrusion of a poor man or woman was resented by the inmates. In others (as, for instance, in the Hospital of St Cross at Winchester), the master appropriated the whole of a great revenue, except what was required to carry out the letter of the founder's will. Abuses of this kind were checked by the appointment of a permanent Charity Commission in 1853. In Scotland, almshouses generally bear the name of Hospital (q.v.).

Almucantar. See Almacantar.

Almug Tree, or ALGUM TREE. This name, occurring in the Old Testament, was formerly supposed to denote a species of acacia, or a coniferous tree like the cypress; but it is now thought more probable that it was one of the kinds of Sandalwood (q.v.), the *Santalum album*, a native of India.

Almuñécar, a seaport town of Andalusia, Spain, 33 miles S. of Granada, with trade in cotton, sugar, and fruit; pop. 8000.

Alnus. See ALDER.

Alnwick ('town on the Alne'), the county town of Northumberland, 38½ miles N. by W. of Newcastle by rail. It is a well-built place, with a large central market-place, a spacious town-hall, and a corn-exchange of 1862. Alnwick was at an early period a fortified town, and one of its four gates remains, with fragments of the walls. At the north entrance of the town stands Alnwick Castle, the seat originally of the De Vescis, and since 1310 of the House of Northumberland (see PERCY). It has been sumptuously restored since 1854 in the Italian palazzo style, and is one of the most magnificent baronial structures in England. During the middle ages, it was a bulwark against the invasions of the Scots, and it was thrice besieged —by Malcolm Canmore, who here met his death; by David I., who captured it; and by William the Lion, who here was taken prisoner. Alnwick ceased in 1886 to enjoy certain prescriptive municipal usages it formerly possessed. Pop. 7000. See the great *History of Northumberland* by Bateson, Hodgson, and others (1893–1910).

Alocasia, a genus of Araceæ. See ARUM.

Aloe (*Aloë*), a genus of plants of considerable medicinal importance, belonging to the Liliaceæ (q.v.). There are about 100 species, most of them indigenous to South Africa. All have stems, but they vary in height from a few inches to 30 feet. They have permanent succulent leaves. The west coast negroes make cords and nets of the fibres of their leaves, and stockings are woven from the fibres of a species found in Jamaica. But aloes are chiefly valuable for their medicinal properties. The well-known drug called Aloes (see below) is the inspissated juice of the leaves of several almost tree-like species, and particularly of *Aloe succotrina*, *Perryi*, *purpurascens*, *spicata*, *arborescens*, and *vera*. The last-named is found in the East Indies, in Italy, and in some of the islands of the Mediterranean, being the only species which can be reckoned European, although it also is probably an introduced plant. The *American Aloe* is a totally different plant (see AGAVÉ). The *aloes* of the Bible was the wood of a tree (see next article). — The juice of aloes was anciently used in embalming, to preserve dead bodies from putrefaction. In the East Indies, it is employed as a varnish to prevent the attacks of insects. A beautiful violet colour is obtained from the leaves of the Socotrine aloe, which also affords a fine transparent colour for miniature painting.

Aloe socotrina.

ALOES is a drug of great antiquity, for we find it mentioned by Dioscorides (50 A.D.). Till modern times, the source of the drug was the island of Socotra, but at present it is imported from various parts of the world. The chief varieties are distinguished by colour, smell, and fracture, and in the London market are: *Socotrine aloes*—derived from *Aloë Perryi*, not from *Aloë succotrina*, which was till recently believed to be the source of the drug; *Barbados aloes; Cape aloes;* and *Natal aloes.*

These various forms of the drug are derived from several species of aloe, but they all agree in possessing a bitter taste, and having powerful purgative properties. Active principles, similar in nature but differing in composition, are found in the three chief varieties. These are Socaloin, $C_{15}H_{16}O_7$, found in Socotrine aloes; Nataloin, $C_{16}H_{18}O_7$, found in Natal aloes; Barbaloin, $C_{17}H_{20}O_7$, found in Barbados aloes.

Employed in small doses as extract, tincture, pills, or otherwise, aloes exerts a tonic, and in larger doses, a cathartic action.

Aloes Wood (sometimes called also Eagle Wood, Calambac, Paradise Wood, or Agallochum) is the heart-wood of *Aquilaria Agallocha*, and *A. malaccensis*, trees of the Thymelæaceæ, natives of the tropical parts of Asia, and supposed to be the aloes or lign-aloes of the Bible. They are large spreading trees. Aloes wood contains a dark-coloured, fragrant, resinous substance, and is much prized in the East as a medicine, and for the pleasant odour which it diffuses in burning. The resinous substance is found only in the inner part of the trunk and branches; the younger wood is white, and almost scentless; hence the pure aloes wood is sometimes obtained by burying the stems, when the sap-wood decays away, leaving the resinous core intact. The ancients ascribed to it similar virtues, and so valued it for these and its fragrance, that Herodotus says it once sold for more than its weight in gold. As it admits of a high polish, and exhibits a beautiful graining, precious gems were set in it; and it was cut into fantastic forms and worn in head-dresses, &c. It was early used to perfume apartments, and Napoleon I. used it as a perfume in his palaces. The fragrance continues undiminished for years. *Lign Aloes* is a corruption of *Lignum Aloes* (literally 'wood of aloe,' where *aloës* is trisyllabic, being the genitive case of Gr. *aloë*).

Some would have it that the true aloes wood is *Excoecaria Agallocha*, a tree of the Euphorbiaceæ, found in the East Indies and Australia, and known as Blinding Tree, from the effect of its poisonous milky juice when it is spirted in the eyes. The genus belongs to the tropics of the Old World.

The name Aloe Wood is applied to *Cordia Sebestana*, a tree of the family Boraginaceæ, found in Florida, the West Indies, and northern South America. It has an edible fruit, which, like that of *C. Myxa* in the East, has been used medicinally.

Aloexylon or AQUILARIA. See ALOES WOOD.

Alogians, or ALOGI, a sect of Christians that arose in Asia Minor about 170 A.D., so called from their rejection of the doctrine that Christ was the divine Logos, and of the fourth gospel, which, with the Apocalypse, they ascribed to Cerinthus (q.v.) the Gnostic. The same name was given later to the Socinians.

Aloidæ. ALOIADÆ, or ALOADÆ, in Greek mythology, were two giants, Otus and Ephialtes, sons actually of Poseidon, reputedly of Aloeus, Poseidon's son. Growing every year an ell in breadth and a fathom in height, they were able at the age

of nine to make war upon the Olympian gods, and proceeded to pile the mountains, Pelion upon Ossa, Ossa upon Olympus, but were killed by Apollo's arrows. According to another account they became suitors for Hera and Artemis. In the island of Naxos, Artemis ran between them in the form of a stag, at which they shot, and so killed each other. One of their feats was to imprison Ares for thirteen months.

Alopecia. See BALDNESS.

Alopecurus. See FOXTAIL GRASS.

Alora, a town of Spain, in the province of Málaga, 23 miles NW. of Málaga by rail. There are ruins of an ancient castle. Pop. 11,000.

Alor Star, capital of Kedah.

Alosa. See SHAD.

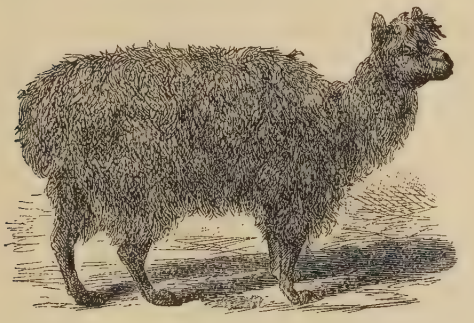
Alost. See AALST.

Aloysia. See VERBENA.

Aloysius, ST, the name given to Luigi Gonzaga, who was born in the castle of Castiglione, near Brescia, 9th March 1568, and was educated at Florence, Mantua, and Rome. Renouncing his marquisate of Castiglione in favour of his brother, he entered the Society of Jesus in 1585. At Rome during a visitation of the plague he gave himself up with wonderful self-devotion to the care of the sick, and, stricken by the malady, died 21st June 1591. He was beatified in 1621, and canonised in 1726. See the *Life of St Aloysius Gonzaga*, edited by E. H. Thompson (1867); the Italian Life by Cepari (trans. by Goldie, 1891); and Aubrey de Vere's *Essays* (1888).

Alp, in Switzerland, means not a mountain, but a pasture situated high on a mountain, used only in summer. Many alps are owned by communities (*Alpgemeinden*).

Alpaca (*Lama pacos*), a domesticated race, belonging to the Camel family, established many ages ago in Peru and Bolivia, and bred for the sake of its fine silk-like wool. The alpaca is smaller than its near relative, the llama (*Lama glama*), another domesticated race, and has a relatively longer neck. The two races are mutually fertile. It is usually held that both llama and



Alpaca.

alpaca have been derived from the wild guanaco (*Lama huanachus*). According to another view, the alpaca is derived from the wild vicuña (*Lama vicugna*). It may also be that the alpaca, while derived from the guanaco, has in it a strain of vicuña blood.

Alpacas live in flocks at great elevations on the Andes, and are shorn every year. There are two kinds of wool, the inner short and soft, the outer very long and strong. It varies much in colour. From time immemorial the wool has been used in South America for blankets and cloaks (*ponchos*), and enormous quantities are now imported into Britain. The credit of introducing and raising to its present magnitude the alpaca wool-manufacture in Britain, which has still its chief seat at Saltaire, is due to Sir Titus Salt. Attempts to establish the alpaca in Europe, the United States, and Australia have not met with much success. Alpaca wool is straighter than that of the sheep, very strong in proportion to its thickness, and breaks little in combing. The fibre is small, and it is very soft, pliable, and elastic.—The flesh of the animal is said to be very wholesome and pleasant.

Alp-Arslan, a Persian sultan, the second of the Seljuk dynasty, born in Turkestan in 1029. In 1059 he ascended the throne of Khorassan, and in 1063, on the death of his uncle, became monarch of all Persia. He embraced Islam, taking the name of Mohammed, and by his bravery obtained the surname of Alp-Arslan ('Brave Lion'). He took and plundered the city of Cæsarea, in Cappadocia. In 1064 he invaded Armenia and Georgia, at that time Christian kingdoms, and added them to his dominions. In 1068 he marched against the Greeks of the Eastern empire, who, under the Emperor Romanus Diogenes, had thrice driven back the Turks beyond the Euphrates. In 1071 the Seljuks gained a bloody victory at Manzikert. The Greek emperor was taken prisoner, and only obtained his liberty by an enormous ransom and a large annual tribute. Marching to the conquest of Turkestan in 1072, the sultan perished by the dagger of a captive enemy.

Alpena, a port and city at the mouth of Thunder Bay River, in Michigan, with foundries and sawmills; pop. 11,000.

Alpenhorn. See KUH-HORN.

Alpes is the name of three departments in France. That of BASSES-ALPES occupies the NE. part of Provence, and is the most sparsely populated in all France. It is for the most part mountainous, consisting of spurs or offshoots from the Maritime Alps, which run in numerous chains towards the Rhone. In the north the climate is cold, the soil poor, and the cultivation bad; in the south the climate is much better—almonds, apricots, peaches, and various other choice fruits are grown. The wines are excellent. The mines produce lead, green marble, &c. At Digne and Gréoulx there are mineral springs. The department is watered by the Durance. The area of the department is 2697 sq. m.; pop. (1901) 112,763; (1921) 91,882; (1926) 88,347; capital, Digne.

The HAUTES-ALPES, lying north of the Basses-Alpes, and forming a part of the old province of Dauphiné, is traversed by the chief range of the Cottian Alps, which here rise, in Mount Pelvoux, to the height of 14,000 feet. The scenery, especially along the course of the impetuous Durance, is singularly picturesque. The *Hautes-Alpes* is, after Savoy, the highest department in France; the fierce north wind and the perpetual snow on the lofty peaks make the climate severe and the winter long, so that the barren soil will yield little else than potatoes, a little rye, oats, and barley, although thick forests clothe the mountain-sides. Area, 2178 sq. m.; pop. (1901) 106,857; (1921) 89,275; (1926) 87,963. The mines produce lead, copper, iron, and anthracite. Every autumn some four or five thousand people leave the colder heights to seek employment during the winter months in the lower department. Chief town, Gap.

ALPES MARITIMES, a department in the extreme SE., on the shores of the Mediterranean and confines of Italy, was formed in 1860. It is made up of the ancient county of Nice, which was ceded in that year to France, and of the arrondissement of Grasse. The chain of the *Alpes Maritimes* forms the northern boundary of the department, and from

it numerous spurs run seaward, among which are lovely and fertile valleys. The climate is delightfully mild on and near the coast, which forms part of the Riviera (q.v.), but the higher mountains reach to altitudes where winter always reigns. The vine and olive are much cultivated in the more favoured localities; tobacco, oranges, lemons, and figs are produced; and much land is devoted to the cultivation of herbs and flowers for the preparation of essences and perfumes. Grasse is particularly famous for the manufacture of perfumery. The silkworm is reared, and honey is largely produced and exported. There are some mineral springs. The tunny, anchovy, and sardine fisheries are important. The capital is Nice (q.v.), and the other principal towns are Antibes, Villefranche, Cannes, Grasse, and Menton or Mentone. The area is 1443 sq. m.; pop. (1901) 320,822; (1921) 357,759; (1926) 435,253.

Alphabet, so called from *alpha* and *bēta*, the first two Greek letters, is the name given to a set of graphic signs, called letters, denoting elementary sounds, by the combination of which words can be visibly represented. These signs reached their final form after passing through stages which, broadly treated, are as follows:

A. The MNEMONIC, or memory-aiding, when some tangible object is used as a message or record. It borders on the symbolic; in fact, it anticipates that stage. It is represented (1) by the ancient Peruvian 'quipus' or knotted cords, the single or double or multiple knots denoting given numbers, while the colours of the cords represented different meanings; and also (2) by the Red Indian wampums or bead and shell ornamented belts, the devices on which recorded events or titles to land. A familiar mnemonic is tying a knot in a handkerchief.

B. The PICTORIAL, which tells its own story, as in the Red Indian record of an expedition across Lake Superior, shown in the illustration. It was led by 'Wolf,' a noted Indian chief. The crew of each canoe is denoted by upright strokes, 'Wolf's' chief ally, 'Kingfisher,' being in the first canoe. The arch with three circles (three suns under heaven)

Fig. 1.—Indian Expedition Record.
(From Schoolcraft's *Indian Tribes.*)

shows that the voyage took three days. The tortoise (a frequent symbol of land in North American picture-writing) may indicate the arrival of the expedition.

In his *Formation of the Alphabet* (1913) Professor Flinders Petrie formulates a theory that the alphabet is traceable to the signary, and not to the pictograph, signs being older than pictures, because the necessity for them arose through trade intercourse and as direction-marks among tribes. But he admits 'the need of further research,' and probably in this, as in other inquiries into origins, it will be found that more than one set of causes have operated to secure a like result.

C. The IDEOGRAPHIC, in which the picture becomes representative—i.e. is converted into a symbol, as an arrow to denote an enemy; a calumet, peace; a bee, industry; an ostrich-feather, justice, because these feathers were said to be of equal length; a brandished whip, power; two arms, one holding a shield and the other a javelin, a battle.

Six probably independent systems of ideographic writing are known: (1) The Cuneiform, which arose in the valley of the Euphrates, and developed into the Achæmenian syllabaries. (2) The Cretan, which was the probable source of the Cypriote syllabary, if not also the Carian and Lycian ones. (3) The Hittite system, perhaps connected with the Cretan. (4) The Chinese, out of which the Japanese syllabaries have arisen. (5) The Egyptian hieroglyphics. (6) The Mexican picture-writing.

The Cuneiform, the Chinese, and the Egyptian scripts will be treated of under their proper headings. See CUNEIFORM, CHINA (*Language, Writing, and Literature*), and HIEROGLYPHICS.

D. The PHONETIC, in which the picture becomes a phonogram, or sound-representing sign. This may be (1) *verbal*—i.e. a sound-sign for a whole word; (2) *syllabic*—i.e. a sound-sign for syllables; or (3) *alphabetic*, a sound-sign for each vowel or consonant.

To recapitulate stages B, C, and D:—In stage B the sign as eye-picture suggests the thing; in stage C the sign as eye-picture suggests the name; and in stage D the sign as ear-picture suggests the sound, and it is in the passage from C to D, whereby constant signs are chosen to stand for constant sounds, that the intellectual progress of the human race was assured, because only thereby was the preservation of all that is of abiding value made possible. In brief, the origin of the alphabet was due to the ingenious discovery that, all the words which men utter being expressed by a few sounds, symbols of these could be selected accordingly; hence the twenty-six letters of our alphabet make up the half-million words contained in the *Oxford English Dictionary*. A perfect alphabet is not possible, because sounds, especially those of vowels, are not constant in any language, and in the case of languages which are no longer spoken, the pronunciation is matter for question not likely to be settled. See ENGLISH LANGUAGE (*Sounds*), PHONETICS, SPELLING.

The ultimate source of the original characters whence our own and cognate alphabets are derived remains uncertain, but their immediate descent from the Phœnician, which was in use about the 10th century B.C., is generally accepted. What remains question for possible settlement is the script whence the Phœnicians, a Semitic people, borrowed or adapted theirs. The transition to a pure alphabetic writing was long assigned to them as borrowers of the art of writing from the Egyptians, whose hieroglyphic picture-writing may be traced back, by means of inscriptions, for more than six thousand years, to the time of the second Egyptian dynasty, when it already appears in great perfection, arguing a long period of antecedent development. It consisted of pictorial ideograms, which, at some unknown epoch, must have given birth to verbal phonograms, some of which came to be used as syllabic signs. Of the 400 Egyptian phonograms, about 45 attained an alphabetic character; that is, they either denoted vowels, or could be associated with more than one vowel-sound. But though the Egyptian hieroglyphic writing contained the germs of an alphabet, it was not truly alphabetic. It remained to the last partly ideographic, partly phonetic. Alphabetic and syllabic signs are conjoined with verbal phonograms, and these are explained by means of pictorial

ideograms. Traditions were current from Plato to Tacitus that 'the Phœnicians did not claim to be themselves the inventors of the art of writing, but admitted that it was obtained by them from Egypt;' while in modern times not a few attempts had been vainly made to derive the several Phœnician letters from suitable hieroglyphic pictures. The supreme merit of the Phœnicians, on this theory, was that they rejected the unnecessary portions of the complicated Egyptian system, the ideograms, the verbal phonograms, and the syllabic signs, and selected from the 45 variant symbols of elementary sounds a single sign for each of the 22 consonants which are found in Semitic speech. To ourselves the notion of alphabetic writing seems extremely simple, but in reality the passage from ideographic picture-writing to a pure alphabet is one of the greatest triumphs of the human mind. None of the other systems of picture-writing—Chinese, Cuneiform, or Hittite—advanced beyond a more or less perfect stage of syllabism.

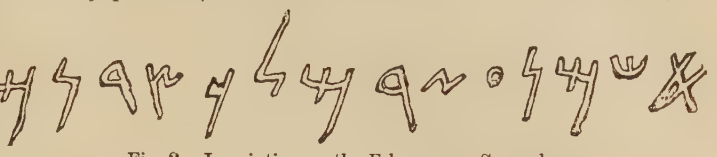


Fig. 2.—Inscription on the Eshmunazar Sarcophagus.
Reproduced by permission from Canon Taylor's *History of the Alphabet* (Arnold).

To a French scholar, Vicomte Emmanuel de Rougé, is due the most elaborate form of the Egyptian theory of the alphabet. In a paper read before the Académie des Inscriptions in 1859 (and rescued from oblivion in 1874) De Rougé worked out a scheme on the theory that the prototypes of the Phœnician letters must be sought, not in the hieroglyphics of the monuments, but in certain cursive 'hieratic' or priestly characters, so extremely ancient that they had already fallen into disuse at the time of the Hebrew exodus. This form of hieratic writing is known to us almost exclusively from a single manuscript, the *Precepts of Ptah-Hotep*, commonly known, after its donor, M. Prisse d'Avennes, as the Papyrus Prisse, found in a tomb belonging to the eleventh dynasty (see illustration at WRITING). In the Papyrus Prisse the characters bear hardly more resemblance to the hieroglyphs from which they were derived than they do to the earliest known forms of the Phœnician letters; but De Rougé insisted that the chief difference was due to the fact that the Egyptian was a cursive script, used for writing on papyrus, whereas the Phœnician letters were lapidary characters, adapted for engraving on stone. Hence straight lines are substituted for flowing curves, and sharp angles for rounded forms. De Rougé attempted to show that twenty-one of the most suitable of the Egyptian characters were selected from the rest, and taken over, only one new letter, *'ayin*, the source of our *o*, having been added by the Phœnicians. His identifications were, for the most part, long accepted by those scholars who were best entitled to speak with authority. One difference was explained by supposing that the Egyptian characters were renamed, on the acrologic or initial principle, by means of words significant in Semitic speech, each of the new names being chosen from a resemblance, more or less close, between the form of the letter and some familiar object whose name began with the letter in question. Thus the first letter was no longer called *ahom*, the eagle, but *aleph*, the ox; and the thirteenth letter, instead of being *mulak*, the owl, became *mem*, the waters. In like manner, in our nursery picture-alphabets, the child is told that O was an orange, S was a swan, and B was a butterfly. A similar acrologic renaming of the letters by significant terms has repeatedly taken place on the transference of alphabets. We have instances in the case of the Runic, the Russian, and the Old Irish alphabets.

On the Semitic side there are the Egyptian words which are given in Semitic form in the Old Testament, and the Semitic names of Syrian towns which are found in the Egyptian annals of conquests under the new empire, through which the sounds severally represented by the Semitic and hieratic characters are arrived at. The chief source of epigraphic evidence is an inscription on the sarcophagus of Eshmunazar, king of Sidon, found in a rock-tomb near the site of ancient Sidon. It dates from the 5th century B.C. (or, as some think, from the 3d), about two thousand years later than the Papyrus Prisse, and therefore represents a later form of the Phœnician alphabet. It is preserved in the Louvre. Eshmunazar, whose mask and mummy are sculptured on it, speaking in the first person, boasts of the temples which he and his mother, the priestess of Ashtaroth, had built to that and other deities. He beseeches their favour, and prays that Dora, Joppa, and Sharon may remain parts of his kingdom. He laments that he is cut off before his time, and implores that no man may open his 'funeral couch,' neither seeking for treasure therein, neither putting it in another tomb.

Symmetrical as M. de Rougé's theory appears, and falling into line with accepted theories of the sources of Western civilisation, it held the field until recent years. But it must be classed with hypotheses lending themselves to the straining of facts in their support, and citing superficial resemblances as proof of relation. In his article on 'Hieroglyphics' in the *Encyclopædia Britannica*, 9th ed., Mr Reginald S. Poole remarked that 'the hieratic forms vary, like all cursive forms of writing, with the hand of each scribe. Consequently the writer who desires to establish their identity with Phœnician can scarcely avoid straining the evidence.' Moreover, the long lapse of time between the materials for comparison invites caution. The Papyrus Prisse is, at least, two thousand years older than the Eshmunazar inscription, and on the evidence supplied by these two hangs the validity of M. de Rougé's theory. But within recent years light upon another possible source of the alphabet has come from hitherto unknown materials.

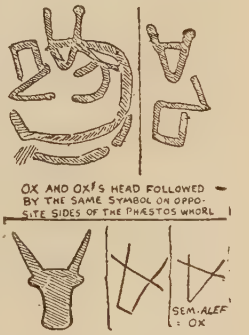


Fig. 3.—Ox Symbol.
Reproduced by permission from Sir A. Evans's *Cretan Pictographs* (Quaritch).

Investigations in Crete since 1893, especially those of Sir Arthur Evans in the palace at Knossos, have disclosed a system of pictographic-writing (in the 'early Minoan period') which develops into an abridged hieroglyphic form ('middle Minoan'), as does that again into two forms of lineary script ('late Minoan'), making out a fair case for a Cretan origin for the Phœnician alphabet. For instance, a Cretan letter identical with *aleph* can be traced to a Cretan hieroglyph representing the head of an ox.

The results of the excavations in Crete are the fact of an indigenous culture and of an active intercourse between that island and Greece, Egypt, Syria, and

other countries many centuries before the Phœnicians launched their craft upon the Mediterranean and trafficked with Cyprus or Crete. And although the Cretan pictographs and linear symbols await decipherment by the aid of a bilingual inscription, such as that on the Rosetta stone, which gave the key to the Egyptian hieroglyphs, sufficient evidence is adduced by Sir Arthur Evans to warrant the inference that the Cretan signs were taken over by the 'Cherethites and Pelethites,' or Philistines, who settled on the coast of Syria, passing on these signs to their neighbours and possible kinsfolk, the Phœnicians. The data for that inference are given in Sir Arthur's paper on 'Primitive Pictographs and a Pre-Phœnician Script from Crete and the Peloponnese' in the *Journal of Hellenic Studies*, vol. xiv. pt. 2 (1897), and, more elaborately, in his *Scripta Minoa*, vol. i. pp. 77 ff. (1909).

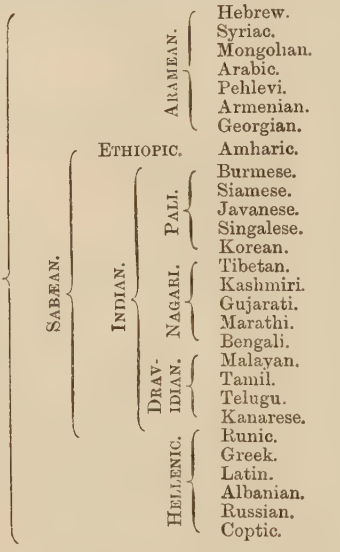
The Phœnician, the mother of alphabets, having arisen out of some form of picture-writing, Cretan, Egyptian, or other, it is not difficult to explain here the affiliation of a few of the more important daughter alphabets, such as the Hebrew, the Syriac, the Arabic, the Indian, the Greek, and last, but not least, the Roman alphabet which we ourselves employ. The 22 letters of the Phœnician alphabet were the fruitful germs from which the letters of all other alphabets have been developed. In the Semitic alphabets the number of letters has remained constant, though the outlines have been so degraded that in some alphabets, such as the Arabic, many letters are almost formless; while in Aryan alphabets new letters have been abundantly developed by differentiation, a process well exemplified in our own alphabet, in which J has been evolved out of I, and G from C, while F, Y, V, U, and W are all descended from the Phœnician *vau*.

The chief difference between Semitic and Aryan alphabets is due to a fundamental distinction between the Semitic and Aryan languages. In the Semitic scripts there are no true vowels, these being denoted only by diacritical points; whereas in the Aryan alphabets vowel-signs have been developed out of the characters representing the Semitic breaths and semi-consonants. The Semitic alphabets have also retained the original direction of the writing, from right to left; whereas in the non-Semitic scripts the more convenient direction, from left to right, has been adopted.

Many attempts have been made to explain the order of the letters in the alphabet. It would take too much space to discuss fully this obscure question, but it is generally recognised that the order of the Hebrew letters exhibits traces of a primitive phonological classification. Omitting certain letters which do not readily fall into the scheme, and whose places may have been assigned at a later time, the original arrangement seems to have been in four classes, containing respectively letters representing the soft, the continuous, the liquid, and the hard sounds, the first letter in each class standing for a faucal breath, the second a labial, the third a palatal, the fourth a dental, and the fifth probably a sibilant. The survivals of this arrangement are exhibited in the following table. The places assigned to the sibilants are hypothetical.

	Faucal Breath.	Labials.	Palatals.	Dentals.	Sibilants.
Soft	*'a*	*b*	*g* (*c*)	*d*	*z*
Continuous	*'e*	*v* (*f*)	*ch* (*h*)	*th* (*t*)	*sh*
Liquid	*i*	*m*	*l*	*n*	*s*
Hard	*'o*	*p*	*q*	*t*	*ts*

We have now to describe the chief families of alphabets to which the mother-alphabet of Phœnicia gave birth. The reader will find it helpful to refer to the following genealogical table. It will be seen that there are three great families—(1) The Aramean, which became the source of most of the alphabets of Western Asia; (2) The Sabæan, or South Semitic, from which sprang the alphabets of India; (3) The Hellenic, which became the parent of the alphabets of Europe.



The early history of the alphabet has to be reconstructed from inscriptions. Some found at Byblus are of the 13th century. Those on certain bronze vessels dedicated to Baal Lebanon, are attributed by some to the 11th century B.C., and by others to the 9th. The Moabite stone, one of the most important of Semitic epigraphs, written in a language closely resembling the Hebrew of the Old Testament, is generally assigned to the 9th century; the bilingual lion weights from Nineveh, to the 8th; the Siloam inscription, to the 7th; and the Eshmunazar sarcophagus, to the 5th. The Phœnician alphabet gradually died out with the decline of the Phœnician empire and commerce, lingering on, in the Spanish colonies of Carthage, till the 3d century A.D., and leaving as its only direct descendant the alphabet used in the sacred books of the Samaritans.

Among the Semitic races it was superseded by the Aramean alphabet, which, arising in Northern Syria about the 7th century B.C., became the commercial alphabet of Western Asia. After an existence of seven or eight centuries, it broke up into a number of national alphabets, of which the most important are the square Hebrew, the Syriac, the Arabic, the Pehlevi, and the Mongolian, which owe their diffusion and their permanence to the fact of their having become the scripts of five of the great faiths of Asia—Judaism, Christianity, Mohammedanism, Zoroastrianism, and Buddhism.

The distinguishing peculiarity of the Aramean alphabet and its descendants lay in the opening out of the loops and the disappearance of the bars which characterise the Phœnician letters. Thus the Phœnician loops which have been faithfully preserved in our own letters B, D, O, Q, R, have disappeared in the corresponding Hebrew letters, as well as in their Arabic equivalents (see table).

The greater part of the Jewish Scriptures must have been written in the alphabet seen in the inscriptions on the Moabite stone and in the Siloam tunnel, which is practically identical with that used by the Phœnicians. On their return from the captivity at Babylon, the exiles brought

ORIGIN OF THE ALPHABET

ACCORDING TO DE ROUGÉ.

I. Egyptian Hieroglyphics, facing to the left.
II. Egyptian Hieratic characters, facing to the right.
III. The oldest Phœnician letters, mostly from the Baal Lebanon inscription.
IV. The oldest Greek letters, from inscriptions at Thera and Athens, reading from right to left.
V. The lapidary Greek alphabet at the time of the Persian war, reading from left to right.
VI. Greek uncials, from the Codex Alexandrinus about 400 A.D.
VII. Greek minuscules.
VIII. The old alphabet of Italy.
IX. Lapidary Latin alphabet at the time of Cicero.
X. Latin uncials and minuscules.
XI. Modern square Hebrew, derived from the Phœnician letters in Col. III.

with them the Aramean script used in the valley of the Euphrates. After the 1st century B.C. this alphabet developed into two branches—the northern, which became the parent of the Syriac alphabets; and the southern, which developed into the square Hebrew. This assumed its present style only about the 12th century, and is thus one of the most modern of existing alphabets, and not, as was formerly believed, the most ancient of all. The Hebrew vowel-points date from about the 7th century. The Syriac arose out of a form of the Northern Aramean alphabet, locally employed at Edessa, which was a great seat of Christian learning. The older form of Syriac, which enshrines an important Christian literature, is called the Estranghelo. This developed into a more curious style called the Peshito, which is still used by the Christians of Aleppo. A curious descendant of the Syriac alphabet is the Mongolian, which arose indirectly out of the heresy of the Nestorians, who, being condemned by the Council of Ephesus in 431 A.D., took refuge in Persia, whence their missionaries penetrated into the remotest parts of Asia, carrying with them their alphabet, which became the parent, on the one hand, of the Karshuni, used by the Christians of St Thomas on the Malabar coast of India, and, on the other, of the Mongolian, Kalmuck, and Manchu alphabets, which stretch intermittently across Northern Asia from the Volga to the Sea of Japan. Prior to the extension of Mohammedanism, the Mongolian was the official alphabet of the vast empire of Genghis Khan, and was used in Khiva and Bokhara, which now employ the Arabic. The Mongolian is written in vertical columns, from the top to the bottom of the page, instead of from right to left, like the Syriac, Arabic, and Hebrew.

In the valley of the Euphrates, the Aramean alphabet gradually exterminated the cumbrous Cuneiform scripts, and became the parent of the Iranian family of alphabets, which are known chiefly from the coins and inscriptions of the Parthian and Sassanian kings who ruled Persia from the 3d century B.C. to the Mohammedan conquest in the 7th century A.D., when Arabic became the script of Persia. The old Persian or Pehlevi writing was taken to India by fugitives from Islam, and is still used by the Parsees of Bombay for their sacred books.

In the 5th century A.D. the western or Arsacidan form of the Pehlevi alphabet, which is akin to the Palmyrene alphabet used in the inscriptions of Zenobia, was reformed and adapted to the use of the Armenians by St Mesrob, who also constructed the Georgian alphabet out of the eastern or Sassanian form of the Pehlevi writing. But the most interesting offshoot of the Iranian alphabet was the Bactrian, which, before the conquests of Alexander, extended over the eastern provinces of the Persian realm to Merv, Herat, and Bokhara, and even reached the Punjab, which formed the Indian satrapy of the empire of Darius. The chief monument of the Indo-Bactrian alphabet is the long inscription engraved on a rock near Peshawar by Asoka, the great Buddhist emperor, who reigned in the 3d century B.C.; but it can be traced by means of the coins of the Indo-Scythian kings nearly to the close of the 1st century A.D. It has left a curious survival in the numerals which we ordinarily use. These, which we call the Arabic ciphers, are really of Indian origin, having been brought from India by the Arabs, and introduced by them into Spain, whence, during the 12th and 13th centuries, they spread over Europe, gradually replacing the more clumsy Roman numerals. Thus our cipher 5 is the Indo-Bactrian letter *p*, the initial of the Sanskrit word *panchan*, five (cf. Greek πέντε). Our 4 is the letter *ch*, the initial of the Sanskrit *chatur*, four (cf. Latin *quatuor*), and 7 is an *s*, the initial of *saptan*, seven. Few things in the history of the alphabet are more curious than the fact, first discovered by Dr Isaac Taylor, that the numeral signs of Europe and America are the letters of an obscure alphabet introduced into India 2400 years ago as a consequence of the conquests of Darius.

The Iranian alphabets of Central Asia were suddenly exterminated by the Arabic, whose rapid diffusion was one of the most remarkable results of the spread of Islam. It extends from Morocco to Sumatra, from Bokhara to Zanzibar, and, with some trifling modifications, it has been adapted to express the sounds of languages as diverse as Arabic, Turkish, Persian, Pushtu, Beluchi, Hindustani, and Malay.

THE GREEK, HEBREW, AND ARABIC ALPHABETS.

GREEK.			HEBREW.		ARABIC.		
A	α	Alpha	א	Aleph	ا		Alif
B	β ϐ	Beta	ב	Beth	ب	ﺑ	Be
Γ	γ	Gamma	ג	Gimel	ت	ﺗ	Te
Δ	δ	Delta	ד	Daleth	ث	ﺛ	The
E	ε	Epsilon	ה	He	ج	ﺟ	Jim
Z	ζ	Zeta	ו	Vau	ح	ﺣ	Hha
H	η	Eta	ז	Zayin	خ	ﺧ	Kha
Θ	ϑ θ	Theta	ח	Cheth	د		Dal
I	ι	Iota	ט	Teth	ذ		Dzal
K	κ	Kappa	י	Yod	ر		Re
Λ	λ	Lambda	כ	Kaph	ز		Ze
M	μ	Mu	ל	Lamed	س	ﺳ	Sin
N	ν	Nu	מ	Mem	ش	ﺷ	Shin
Ξ	ξ	Xi	נ	Nun	ص	ﺻ	Ṣad
O	ο	Omicron	ס	Samekh	ض	ﺿ	Ḍad
Π	π	Pi	ע	'Ayin	ط	ﻃ	Ṭa
P	ρ	Rho	פ	Pe	ظ	ﻇ	Ẓa
Σ	σ ς	Sigma	צ	Tsade	ع	ﻋ	'Ain
T	τ	Tau	ק	Qoph	غ	ﻏ	Ghain
Υ	υ	Upsilon	ר	Resh	ف	ﻓ	Fe
Φ	φ	Phi	ש	Shin	ق	ﻗ	Qaf
X	χ	Chi	ת	Tau	ك	ﻛ	Kef
Ψ	ψ	Psi			ل	ﻟ	Lam
Ω	ω	Omega			م	ﻣ	Mim
					ن	ﻧ	Nun
					ه	ﻫ	He
					و		Waw
					ى	ﻳ	Ye

As the square Hebrew and the Syriac arose out of the local alphabets of Jerusalem and Edessa, so the Arabic, next after the Latin the most important alphabet in the world, was originally only the local alphabet of Mecca. It has two forms—the Kufic, a monumental script now almost disused; and the Neskhi, which is the cursive Arabic in ordinary use.

There were two early alphabets in Arabia. The Arabic is descended from the Nabathean, an Aramean alphabet of Northern and Central Arabia, known to us chiefly from inscriptions, dating from the 1st to the 5th century A.D., engraved on the rocks of Petra and Sinai. On the other hand, numerous inscriptions, some as old as the 2d century B.C., chiefly from the neighbourhood of Aden, show that a very different alphabet, called the Sabean or Himyaritic, was employed in Arabia Felix. It seems to have been derived from the alphabet of Tyre, and may probably have been obtained as early as the time of Hiram. Carried to the opposite coast of Africa, it became the parent of the alphabets of the Abyssinian Christians, called the Ethiopic and the Amharic, in which new letters have been added, and their order and some of their names changed, while the alphabet has been converted into a syllabary.

But the chief interest of the Sabean alphabet arises from its having become the parent of the modern scripts of India, which comprise more than half of the existing alphabets. We have already seen that an Aramean alphabet was introduced into the Punjab through Afghanistan about 500 B.C., but this was ultimately replaced by an offshoot of the alphabet of Yemen, which, about the same time, must have been brought to the ports of Western India by Arabian merchants. From the inscriptions of Asoka, the Constantine of India, whose edicts, engraved on rocks and pillars, extend across the whole breadth of India from Gujarat to Orissa, we obtain a knowledge of the ancient type of the Indian alphabet. In the hands of the early Indian grammarians it became the most perfect scientific alphabet of the world. Consisting of forty-two letters—thirty-three consonants and nine vowels—it is capable of expressing the most delicate gradations of the Sanskrit sounds.

The developments of the primitive Indian alphabet may be traced, by means of inscriptions, from the time of Asoka, in the 3d century B.C., to the 10th century A.D., when the prototypes of the present provincial alphabets of India had established themselves. The existing vernacular alphabets divide themselves into four well-marked groups: (1) The Pali, or Buddhist, comprising alphabets used in Ceylon, Burma, Siam, Pegu, Cambodia, Java, and Korea. (2) The Nagari, or Hindu, of which an old form is used for Sanskrit books, and to which belong the local alphabets of Northern India, including those of Bengal, Kashmir, Nepal, Tibet, Gujarat, and the Punjab. (3) The Dravidian, used in Southern India, of which the Tamil and Telugu are the chief varieties. (4) The Malay, used in Celebes, the Philippines, and Sumatra. See DEVANAGARI, WRITING.

The alphabet of Southern Arabia, the parent of the numerous Indian scripts, branched off from the Phœnician stem about the 10th century B.C., a date which must also be assigned to a still more important offshoot of the Phœnician. This was the Hellenic branch, the source of the alphabets of Europe and America. A Greek legend refers the introduction of the alphabet to Cadmus, the Tyrian. Cadmus is an eponymic name, meaning in Semitic speech 'the man of the East.' Herodotus tells us that Cadmus landed first in Thera, an island in which the oldest Greek inscriptions have been found. But this legend is a very small portion of the evidence for the Phœnician origin of the Greek alphabet. It is established by the forms of the letters, which in the oldest Greek inscriptions do not differ appreciably from those in early Phœnician records; by the order of the letters, which is the same in the Greek and Phœnician alphabets; and also by their names, which are significant Semitic words, though meaningless in Greek. Thus Alpha is the Semitic *aleph*, an ox; Beta is *beth*, a house; Gamma is *gimel*, a camel; Delta is *daleth*, a door; E-psilon is *he*, a window; Eta is *cheth*, a fence; Theta is *teth*, a serpent; Iota is *yod*, a hand; Kappa is *kaph*, the palm of the hand; Lambda is *lamed*, an ox-goad; Mu is *mem*, the waters; Nu is *nun*, a fish; O-micron is *'Ayin*, an eye; Pi is *pe*, the mouth; Rho is *resh*, the head; and Tau is *tau*, a mark or cross.

A knowledge of alphabetical writing must have been obtained by the Greeks from the Phœnician trading settlements in the Ægean, as early as the 10th century B.C. At the date of the oldest Greek inscriptions which are extant, three vowels, *alpha*, *epsilon*, and *omicron*, had already been evolved out of the Phœnician breaths, *aleph*, *he*, and *'ayin*, and two, *iota* and *upsilon*, from the semi-consonants *yod* and *vau*. The forms of the letters had undergone hardly any change, and the direction of the writing is still retrograde, from right to left, as in the Semitic scripts. Somewhat later, the direction is *boustrophēdon*, or 'ploughwise,' the lines proceeding alternately from right to left, and from left to right, just as the plough draws the alternate furrows in opposite directions. Before the close of the 7th century, the more convenient plan of writing all the lines from left to right was adopted.

By the middle of the 6th century, the Greek alphabet had in all essential respects attained its final development. The letters had assumed the forms of the Greek capitals with which we are familiar; two additional vowels had been evolved, *eta* from *cheth*, and *omega* from *omicron; phi* had been differentiated out of *theta*, *chi* out of *kappa*, and *psi* probably out of *phi;* while F, Q, and *san*, descended from *vau*, *qoph*, and *tsadde*, were disused as letters, though they were still retained as numerals. About the 3d century B.C. the lapidary characters, which correspond to the capitals in Greek printed books, began to be replaced by more rounded forms which are called uncials, while cursive forms were used for correspondence. Finally, between the 7th and 9th centuries A.D., the minuscules, which are the small letters of our printed Greek books, were evolved from a combination of uncials and cursives.

The foregoing account refers to the Ionian alphabet, which grew up on the coasts of Asia Minor, and was adopted as the alphabet of Athens in 403 B.C. But the Greek alphabet, from a very early time, shows a tendency to separate into two types—the Eastern or Ionian, which became the classical alphabet of Greece; and the Western or Chalcidian, which was the source of the alphabet of Italy. The chief differences between the two are those which still distinguish our own from the Greek alphabet. In the Western alphabet, F and Q were retained; H continued to be a breath, instead of developing into a vowel; and the forms of l, r, p, x, s, became L, R, P, X, S, instead of Λ, P, Π, Ξ, Σ.

The primitive alphabet of Italy, from which our own is derived, belonged to the Western Greek type. As early, probably, as the 9th century B.C., it was carried by the Chalcidians of Eubœa to Cumæ, near Naples, which was a colony of Chalcis. It became the parent of five local Italic alphabets—the Oscan, the Etruscan, the Umbrian, the Faliscan, and the Latin. Owing to the political supremacy of Rome, the Latin ultimately displaced the other national scripts of Italy, and became the alphabet of the Roman empire, and afterwards of Latin Christendom, thus spreading over Western Europe, America, and Australia, and becoming the dominant alphabet of the world; its only rival as a cosmopolitan script being the alphabet of the Koran.

Curiously enough, this, the most modern of alphabets, has adhered more closely than any

other to the primitive Phœnician type. Of the Phœnician letters, the Greek alphabet discarded three and added five, while the Latin has only discarded two and added three. Its archaic character is shown by the use of the older forms, L and S, instead of Λ and Σ, and by its retention of the older value of H, and of the letters F and Q, which the Greek alphabet has lost. But it lost ϕ, χ, and θ, as letters, whose Western forms, however, are retained as the Roman numerals, M, L, and C.

At the time of the early empire, the Romans employed two forms of their letters—capitals for inscriptions; and for business and correspondence, degraded cursive forms, which are known to us chiefly from *graffiti* scribbled by schoolboys on the walls of Pompeian houses. These two Roman scripts are respectively the sources of our own printed capitals, and of our printed minuscules or small types. Out of the Roman cursive, the Irish semi-uncial was developed as a book-hand about the 6th century A.D. Through Scotland it was introduced into Northumbria by Irish monks, and became the basis of the beautiful Caroline minuscule, so called because it arose in the reign of Charlemagne, in the calligraphic school at Tours, founded by Alcuin of York.

Owing to its intrinsic merits, consisting in its legibility, and the ease with which it could be written, the Caroline minuscule rapidly became the book-hand of Europe; but, after the 12th century, it began to degenerate into the black-letter, which was imitated in the types of the earliest printers, and is still retained in some German books. The Roman printers, however, reverted to the better Caroline forms, which now go by the name of 'Roman' type. These types were brought to Paris in 1470, and fifty years later to England, where they displaced the black-letter which had been previously used.

The wide difference existing between the forms of our capital and smaller letters is thus explained. We have, in fact, two alphabets, both dating from the 1st century A.D., in concurrent use. Thus the forms a, b, d, r, g, m, h, are derived from the old Roman cursive, while A, B, D, R, G, M, H, are the Roman capitals. In d, the loop of D has been transferred from the right to the left of the vertical stroke; in g, two new loops have been formed, the little crook at the top being all that remains of G; in b, the upper loop of B opened out, and ultimately disappeared; in r, the loop and tail of R have undergone nearly complete atrophy; while in f, the tick to the left is all that remains of the lower curve of S (see table).

In our own alphabet, the order of the letters does not differ very greatly from the Phœnician arrangement, but the few changes are historically instructive. The last Phœnician letter was *t*, which in our alphabet is followed by six letters, *u*, *v*, *w*, *x*, *y*, *z*. Of these, *u* dates from the 9th century B.C., having been differentiated by the Greeks out of F, and placed after *t*, the last of the old letters. Originally, *u* and *v* were only the medial and initial forms of the same letter. In the 10th century A.D. the first came to be used for the vowel, and the second for the consonant, because in Latin words the consonant usually occurs at the beginning, and the vowel in the middle of words, and the two forms were regarded as separate letters, and placed side by side in the alphabet. So also with w, which arose in the 11th century as a ligature, like æ, fi, or &, the ligature for *et*. It was originally written *vu*, and then *vv*, out of which W arose. These new forms were squeezed in, so to speak, between *u*, the last of the old Greek letters, and X, the last of the original Latin letters. The letter *x* was developed out of *samekh* (*s*), about the 7th century B.C., and was placed at the end of the old Latin alphabet. In the time of Cicero, the Romans borrowed Y from the Greek alphabet, to denote the sound of *upsilon*, and placed it at the end of the alphabet after X. Soon afterwards, Z was also borrowed from the Greek alphabet and placed after Y. It was introduced into the English alphabet from the French in the 15th century, being only used in English, as in Latin, to spell words of foreign origin. The letters I and J, like U and V, were the medial and initial forms of the same letter; but since the consonantal sound usually occurs at the beginning of words, and the vowel-sound in the middle, J was conveniently appropriated in the 15th century for the consonant, and I for the vowel. The dot of *j*, which is needless, is a mere survival, showing that the two forms were differentiated after the practice of dotting the *i* had come into vogue. In the 11th century, the letter was accented, í, for convenience, when it came next to *u*, *m*, or *n*; in the 14th, the accent was changed to a dot; and it was only in the 15th that the dot became universal. In the Latin and English alphabets, the seventh letter is *g*; while in the Phœnician, as well as in the Greek, the seventh letter is *z*. We have already seen why *z* was removed to the end of the alphabet. The third letter originally had the value of *g*, but its symbol, C, came in Latin to have both sounds, *c* and *g*. This was inconvenient, and the form G was differentiated out of C, to denote the latter sound, and was transferred in the 3d century B.C. to the seventh place, hitherto occupied by *z*, which had fallen out of use, not being required for Latin words, and was only reborrowed two hundred years later for the transliteration of Greek words.

The Anglo-Saxons adopted into their alphabet two of the Runes, ƿ, called *wen*, for *w*, and þ, called *thorn*, for *th*. The first was disused after the invention of W, but the other is still occasionally employed by old-fashioned people, who write 'yᵉ' for 'the,' the Y-shaped letter being merely a survival of the *thorn* Rune. See THORN.

In the Latin alphabet, the vowels are called by their sounds; the consonants, by the sound of the letter combined with the easiest vowel, which, for convenience of utterance, precedes the continuants and follows the explosives. Thus we have *ef*, *el*, *em*, *en*, *er*, *es*, but *be*, *de*, *ge*, *pe*, *te*, because *ef* is easier to pronounce than *fe*, while, on the other hand, *be* is easier than *eb*. The sounds of *k*, *h*, *q*, which are pronounced farther back, are each combined with the appropriate back vowel, for facility of pronunciation. The name of *z* is an exception to the rule. We call it *zed* and not *ez*, because the letter, with its Greek name *zeta*, was introduced into the Latin alphabet from the Greek after the Latin letters had acquired the names from which our names are derived.

The Greek alphabet was the source not only of the Latin, but of the other national alphabets of Europe. The Runes (q.v.), which formed the alphabet of the Scandinavian nations, were based on early forms of the Greek letters, which, as Taylor showed, were obtained about the 6th century B.C. from Greek colonies on the Black Sea, by Gothic tribes who then lived south of the Baltic. The Ogams (q.v.), used in the earliest inscriptions of Wales and Ireland, seem to have been based upon the Runes. The Mœso-Gothic alphabet was constructed by Ulphilas in the 4th century, by a combination of the Runes and the contemporary Greek uncials. The Coptic alphabet, used in Egypt, was also derived from the Greek uncials of the 4th century A.D., with six additional characters borrowed from the Egyptian Demotic, a cursive script derived from the hieroglyphic writing. The Slavonic alphabets, of which the Russian is the most

important, were obtained from the 9th-century Byzantine uncial, with some additional characters derived from ligatures employed in the Greek cursive writing. The obscure Albanian alphabet is merely a debased form of minuscule Greek.

See articles on the several letters (A, B, &c.; THORN), PALÆOGRAPHY, SPELLING, WRITING; Sir Arthur Evans's *Scripta Minoa* (vols. i. and ii. 1910–11); Dr Isaac Taylor's *The Alphabet* (2d ed. 1899); Clodd's *Story of the Alphabet* (1900); Lenormant's *L'Alphabet Phénicien;* Kirchhof's *Griechisches Alphabet;* Gardthausen's *Griechische Palæographie;* Wattenbach's *Anleitung;* Ballhorn's *Alphabet;* Faulmann's *Buch der Schrift;* Dr Peter Giles in *Encyclo. Brit.*, 11th ed. For a summary of various theories of the origin of the alphabet, see Dr Peter in *Journal of American Oriental Studies*, vol. xxii.

Alphe'us (*Rufea*) is the chief river of Peloponnesus (Morea), rising in the SE. of Arcadia, and flowing past the famous Olympia westwards into the Ionic Sea. In its passage through Arcadia, a country consisting of cavernous limestone, it repeatedly disappears under ground and rises again. With this fact was connected a remarkable myth. The river-god Alpheus was said to have become enamoured of the nymph Arethusa while bathing in his stream. To escape him, she prayed to Artemis, who changed her into a fountain, and opened up an underground passage for her to Ortygia, a small Sicilian island in the harbour of Syracuse. The river still pursued the nymph, passing from Greece to Sicily below the sea, without mingling his waters with it, and appearing in the spring that bubbles up by the shore, close by the fountain of Arethusa.

Alphonsine Tables. See ALFONSO X.

Alphonso. See ALFONSO.

Alpine Climbing. De Saussure, in virtue of his ascent of Mont Blanc (August 1787), and the published account thereof, may be looked upon as the father of mountaineering. For many years, however, climbing was almost confined to this peak, and the amusement was little appreciated. Albert Smith (who ascended Mont Blanc in 1851) stimulated public curiosity, but the real development came with the formation of the Alpine Club in 1857–8, and the publication of *Peaks, Passes, and Glaciers* in 1859. Mountaineering then at once sprang into fashion. Nor was this to be wondered at. Practically, a new pleasure had been invented —health-giving and adventurous. The Alps were easily accessible, and the natives of the country were so far civilised, that the traveller who could put sufficient money in his purse had nothing to fear. The first pioneers of the Alps were explorers and geographers, rather than climbers; but, as was only natural, the high mountains soon began to attract, and many found pleasure in climbing for its own sake. The natives of the alpine valleys, speaking generally, were expert mountaineers, and a race of instructors was therefore ready to hand. Gradually mountaineering as an art began to develop, and gradually the real began to be dissociated from the imaginary dangers of the Alps; for beyond question, a certain amount of risk was run, but it was found that this could be minimised by experience and acquired skill. It is no exaggeration to say that the first accident on the Matterhorn, in 1865, did much to popularise the amusement, which only needed the advertisement of a little hostile criticism. Cavillers questioned what the pleasure might be; and hinted that vanity was at the bottom of it. The Alpine Club itself furnishes one answer, for it numbers over 700 members, including men of the most varied tastes and pursuits in life, whom probably no other bond on earth, save the fascination of mountaineering, could have united together. The charm is very composite in its nature. The mere healthiness of the pursuit, no doubt, attracts many. Again, there is always pleasure in overcoming natural difficulties by acquired skill; and the feeling that by doing a thing in the right way, real risks can be to a great extent abolished, is in itself alluring. As an illustration, may be instanced the use of the rope, especially on snow mountains. If three persons were to walk up such mountains as Mont Blanc or the Jungfrau without using the rope, or without using it properly, they would be in continual peril; united together at intervals of ten or twelve feet, the party should be perfectly safe from all dangers of slips and crevasses. Mountaineering has opened up what would otherwise be the *terra incognita* of the regions above the snow-line, with all their wild beauty and grandeur, and has made them accessible to the many. Despite its ever-increasing roll, fatal accidents among members of the English Alpine Club are exceedingly rare, only three deaths from mountaineering being recorded in the ten years ending 1913.

But still there are real dangers, which cannot be wholly eliminated even by the most skilful climber. The mountaineer who refuses to recognise that such is the case, runs the greatest risk of all. No man takes proper precautions who undertakes an expedition which, under favourable conditions, is only just within his powers. Unexpected difficulties may occur, and the climber who has no reserve to draw upon, is at every instant in grave peril; and so too are all the members of his party. Some knowledge and judgment of the weather are indispensable. The easiest mountain may become most formidable in a storm or a gale of wind. But for those who have the courage of their opinions, and are not afraid to turn back and abandon a half-completed expedition, or who decline to start under unfavourable conditions, bad weather need have little terror. The risk of avalanches is greatest in the spring and winter, and least in the summer months, when the Alps are chiefly visited. Experience alone will teach a man where and at what time of day, on any particular mountain, avalanches are most prone to fall. On rock mountains—and these attract chiefly on account of their greater variety—there is, on the whole, perhaps, less risk to run, though bad weather is equally formidable. The rope is less valuable, but it is less needed, since the climber has hand as well as foothold. Falling stones constitute a real but still a much exaggerated danger. The difficulties of descending a peak are, broadly speaking, as great as, but not greater than, those of ascending; but men are apt to become careless when the main object of an expedition is achieved, and directly inattention creeps in, the risk begins. Mountain vertigo is much rarer than is commonly imagined. The climber is not perpetually walking along the edge of unfathomable precipices. Probably but few members of the Alpine Club could stand on the edge of a parapet, and look down a height of say 100 feet, without feeling uncomfortable, and yet they may have ascended most of the great peaks of the Alps, without ever having experienced any sensation of the sort. No doubt the moral support of the rope accounts in part for this, but the real fact is that there are few places in the Alps where the climber's nerves are tried as in the imaginary position pictured.

Of the special equipment required, the most essential items are reliable boots, properly nailed. A man unsuitably shod runs more risk in walking alone over a steep dry grass slope, than in climbing the Matterhorn, provided he has a sufficiency of practised guides, is properly equipped, and is in good condition. The use of the ice-axe or of the

alpenstock has to be learned like that of the oar or the cricket bat—by practice. The most efficient plan, after all, of guarding against the real dangers of the Alps, consists in employing only thoroughly competent and trustworthy guides; yet it must be borne in mind that guiding too is an art, and it by no means follows because a man is an expert climber, that he is fit to take charge of a party. Alpine Clubs have done much to raise the standard of guides, and to ensure the safety and comfort of climbers by the provision of mountain huts and the dissemination of information through their journals. In selecting guides for difficult expeditions, the advice of competent judges should always be taken.

The idea of founding the Alpine Club originated with Mr William Matthews. The *Alpine Journal*, by members of the club, published quarterly, began in 1863. Members are elected by ballot, if their qualifications, whether climbing, literary, artistic, or scientific, have been previously approved by the committee. In quest of new peaks to conquer, the club has extended its operations to other ranges than the Alps. Among the more famous first ascents may be mentioned those of the Matterhorn (Whymper, 1865); the Schreckhorn (Stephen, 1861); Elbruz in the Caucasus (Freshfield, Grove, 1868, 1874); Cotopaxi and Chimborazo in the Andes (Whymper, 1880); Mount Cook (Green, 1882). Sir Martin Conway climbed several Andean peaks, and in 1892 one of the Karakoram Himalayas. The Duke of the Abruzzi climbed Mt. St Elias in 1900, Ruwenzori in 1906, and almost managed K^2 in 1909. A Mount Everest campaign began in 1921. At its jubilee celebration the English Alpine Club claimed to be the mother of no fewer than 166 Alpine Clubs in every part of the globe, including a women's Alpine Club formed in London in 1907. An Austrian Alpine Club (1862) was followed by Swiss (1863), Italian (1863), German (1869), and other associations. Climbing is not their sole purpose; they devote themselves largely to the scientific investigation of the Alpine area. The amalgamated German and Austrian Club has over 100,000 members.

See Ball's *Alpine Guide* (1868–70; new ed. 1898–1911); books by Tyndall and Whymper; the Badminton book on *Mountaineering*, by Dent and others (1892; 3d ed. 1900); G. D. Abraham, *The Complete Mountaineer* (1907); *Mountain Craft*, by G. W. Young and others (1920); the 'Climbers' Guides' series, ed. by Conway and Coolidge (10 vols. 1900–4); Harold Raeburn, *Mountaineering Art* (1920); and books by Conway and by Coolidge.

Alpine Plants, a name given not only to plants found at elevations approaching the limit of perpetual snow in the Alps, but also to plants belonging to other mountainous regions in any part of the world, whose natural place of growth is near snows that are never melted even by the beams of the summer's sun. As the elevation of the snow-line, however, varies very much in different countries, according to the latitude, and also from peculiar local circumstances, the term Alpine Plants is not so much significant of the actual elevation of the habitat, as of the average temperature which prevails there. On the Andes, near the equator, at an elevation of 12,000 to 15,000 feet above the level of the sea, many kinds of plants are found, of humble growth, resembling in their general appearance those which occur in Germany and Switzerland at an elevation of 6000 feet; and these again either resemble, or are even identical with, the species which in Lapland grow upon hills of very little elevation, or which, in the northern parts of Siberia, are found at the level of the sea. Similar plants occur also in the Himalaya Mountains, at elevations varying remarkably within very narrow geographical limits from local causes, which also create great differences in the general dryness or humidity of the atmosphere. The laws of this natural distribution of plants were investigated first by Humboldt, De Candolle, and others, and more recently elucidated by Warming, &c., and form the most essential part of a branch of science still in its infancy—phytogeography (see ECOLOGY, GEOGRAPHICAL DISTRIBUTION). When the alpine plants of Central Europe are spoken of, those are meant which grow at an average height of 6000 feet, marking what, in the language of distributional science, is called the alpine *zone*. This, on its northern limit, the Riesengebirge, falls as low as 4000 feet, and rises, in the southern Alps and Pyrenees, to an elevation of 9000 feet, and sometimes even above it. Although very rich in forms peculiarly its own, this zone contains many plants which are likewise found on much lower hills, and even in the plains. The number of these, however, diminishes as the elevation increases. Hence the small spaces clear of snow in the highest regions possess a very characteristic flora, the plants of which are distinguished by a very low diminutive habit, and an inclination to form a thick turf, frequently also by a covering of woolly hairs, whilst their stems are very often either partly or altogether woody, and their flowers are in proportion remarkably large, of brilliant colours, and in many instances very odoriferous, upon which accounts they remarkably attract and please the occasional visitors from the plains. In the Alps of Central Europe, the eye is at once caught by gentians, saxifrages, rhododendrons, and various species of primrose, as well as by the rarer edelweiss—*Gnaphalium* (*Leontopodium*) *alpinum*. With these and other phanerogamous plants are associated a number of delicate ferns and exceedingly beautiful mosses. The highest mountains in Scotland exhibit a somewhat similar flora, and beautiful plants, both phanerogamous and cryptogamous, are found on them, which never appear in lower situations, as the Alpine Speedwell (*Veronica alpina*), the small Alpine Gentian (*Gentiana nivalis*), the Rock Scorpion Grass, or Alpine Forget-me-not (*Myosotis alpestris*), *Azalea procumbens*, *Woodsia ilvensis* and *hyperborea*, &c. Many alpine plants are limited to a very small district. Thus, the flora of Switzerland differs considerably from that of Germany, the latter being now known to contain 3400 phanerogamous plants, of which the former contains 2200, and along with them also 126 species which have hitherto been found only in the Swiss Alps.—There are, moreover, particular species of plants which are found only in single localities, as *Hypericum coris*, upon the Wiggis Mountains in the canton of Glarus; *Wulfenia carinthiaca*, upon the Küweger Alp, in Upper Carinthia; and many others. There are, however, many species which, occurring on the mountains of Central Europe, appear also in those of Britain and Scandinavia at lower altitudes, but are not found in the intervening plains. The colonies of alpine plants on mountainous regions are the survivors of the widespread arctic-alpine flora of glacial periods, which saved themselves in low latitudes by retreating to the heights upon the disappearance of cold climatic conditions from the low grounds. Cryptogamic plants are generally found in alpine regions in much greater abundance than elsewhere. The great beauty of Alpines, even when dried, makes them favourites with those plant-collectors who have amusement more in view than the mere interests of science. Small herbaria of them are offered for sale everywhere in Switzerland; and in some places large collections have been prepared and thrown open to the public. The introduction of alpine plants into our gardens was formerly attended with difficulty, and success in establishing

them was limited; but thanks to improved facilities in travelling, the extension of rapid means of communication, and, above all, to the dissemination of correct views of the requirements of these beautiful wildings under cultivation, there is now nothing to prevent our having the alpine flora of the world well and fully illustrated in our gardens. In fact, the progress that has been made, since about 1870, in introducing and successfully establishing species that were prior to that time considered incapable of existing out of their own peculiar habitats, is perhaps the most remarkable achievement of modern gardening art. The specially important collections in our leading botanical gardens are becoming yearly more rich in new species, by importation from their native wilds; and many of those that have been some time under cultivation, are developing varieties with distinctive characteristics of feature and constitution—a sure sign that the plants are tractable and amenable to the circumstances of cultivation. The number of private collections of alpine plants in Britain has greatly increased also within the past few years, and nurserymen are devoting more attention to their culture, showing that taste in flower-gardening is strongly tending in a more intellectual and satisfying direction, to all who take an interest in the art. The rich variety in colour and form, and the strongly-marked individuality that may be introduced into every flower-garden by employing freely these lowly but brilliant inhabitants of alpine regions in its embellishment, will mark a new era in English flower-gardening. Many alpine flowers, especially edelweiss and the alpine rose, threaten to become extinct in their native haunts, and in 1887 the government of Valais made inclosures for the protection and cultivation of these plants. For easy scientific introduction, see Schimper's *Plant Geography* and Warming's *Œcology*. Alpine Floras are numerous.

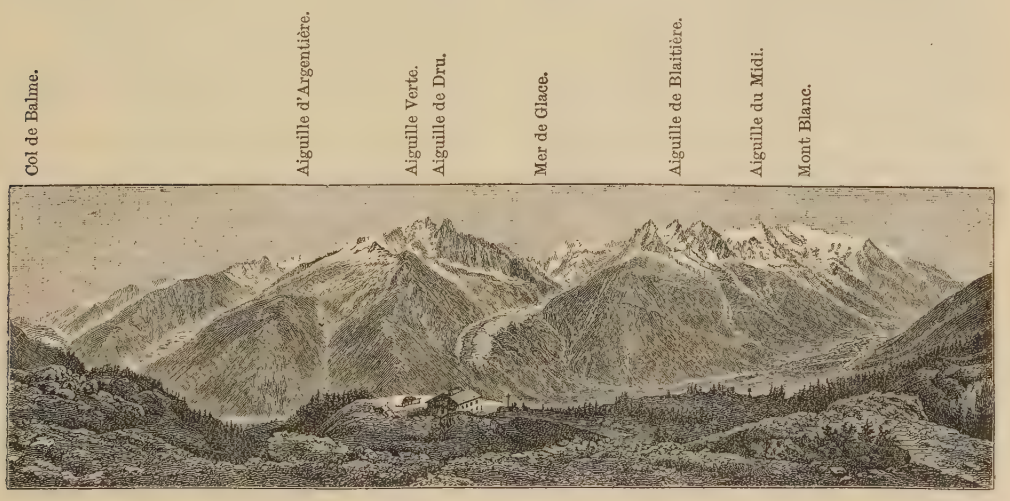
Alpini. See BERSAGLIERI.

Alpin'ia. See GALANGALE.

Alpnach, or ALPNACHT, a Swiss village, in the canton of Unterwalden, at the foot of Mount Pilatus, 1½ miles from that part of Lake Lucerne called Lake Alpnach. It is known principally on account of its celebrated 'slide,' now disused, which was 8 miles long, and by means of which timber was brought from the forests of Mount Pilatus to the village.

Alps (possibly a Celtic word meaning 'high;' cf. Gaelic *alp*, 'a high mountain;' or connected with Lat. *albus*, 'white'), the most extensive system of lofty mountains in Europe, raising their giant masses on a basis of 90,000 sq. m., between 6° 40′ and 18° E. long., and extending in some places from the 44th to the 48th parallel of latitude. The Alpine system is bounded on the N. by the hilly ground of Switzerland and the upper plain of the Danube; on the E., by the low plains of Austria; on the S., by the Adriatic Sea, the plains of Lombardy, and the Gulf of Genoa; and on the W., by the plains of Provence and the valley of the Rhone. A string of lakes encircles both the northern and southern bases of these mountains, the former at an elevation of 1200 to 2000 feet; the latter, 600 to 700 feet. The varied natural scenery of France, Italy, Germany, and Austria has a common centre of union in this lofty region. Valleys open out in all directions, sending their melted snows on one side into the North Sea, on another into the Black Sea, and on another into the Mediterranean.

The *water-system* of the Alps may be thus briefly



The Chain of Mont Blanc from the Flegère across the Valley of Chamouni.

sketched: (1) In the basin of the Rhine there is the Rhine itself, which partly forms the Lake of Constance, at the north-eastern extremity of Switzerland, and receives on the left the important tributaries of the Thun and the Aar; the latter of which flows through Lakes Brienz and Thun, and is itself augmented by various affluents, the largest of which are the Reuss and the Limmat. (2) In the basin of the Danube there flow from the south the Iller, Lech, Isar, and the Inn. Still farther east, the Danube has for its tributaries the Traun, the Ens, the Raab, the Drave, and the Save, the last three of which have their sources in the extreme Eastern Alps. (3) In the basin of the Po, there are numerous streams which rise in the Southern Alps; the principal of these are the Dora Baltea, the Ticino from Lake Maggiore, the Mincio from Lake Garda, and the Adige. (4) In the basin of the Rhone, there are the Rhone (flowing through the Lake of Geneva), and various Alpine tributaries, the most important of which are the Arve, the Isère, and the Durance. (5) The Var is the principal Ligurian coast-stream; the Piave, and the Tagliamento, the largest of those which fall into the Adriatic from the Southern Alps.

Divisions.—In order to give a clear view of the manifold ranges of this mountain-land, a distinction is generally made between the East, the West, and

the Middle Alps; the last of which is again divided into a northern, central, and southern chain; while a natural separation by river-valleys into groups is also made. I. West Alps.—The principal ranges of these are: (1) The Maritime Alps, extending from the middle Durance southwards to the Mediterranean, and rising in the Aiguille de Chambeyron to a height of 11,155 feet. (2) The Cottian Alps, north of these, whose highest summit, Monte Viso, is 12,605 feet. (3) The Dauphiné Alps, separated by the valley of the Durance from the Cottian; their highest summit is the Pic des Ecrins, 13,462 feet. (4) The Graian Alps, forming the boundary between Savoy and Piedmont, and attaining in the Grand Paradis, an elevation of 13,300 feet. II. Middle Alps. *Central Chain.*—(1) The Pennine Alps, between the plains of Lombardy and the valley of the Rhone. Highest summits: Mont Blanc, 15,732 feet; Monte Rosa, 15,151 feet. (2) The Lepontian or Helvetian Alps, from the depression of the Simplon, along the plateau and masses of St Gotthard, to the pass of Splügen. (3) The Rhætian Alps, between the Inn, the Adda, and the Upper Adige. *Northern Chain.*—(1) The Bernese Alps, between the Rhone and the Aar. Highest summits: Finsteraarhorn, 14,026 feet; Aletschhorn, 13,803; Jungfrau, 13,671 feet. (2) The Alps of the Four 'Forest Cantons,' the Schwyz Alps, &c. *The Southern Chain.*—(1) The Ortler Alps, between the Adda and the Adige. (2) The Trientine Alps, between the Adige and the Piave. III. East Alps.—The principal chains of these are: (1) The Noric Alps, between the plains of the Drave and the Danube. (2) The Carnian Alps, between the Drave and the Save. (3) The Julian Alps, between the Save and the Adriatic Sea.

A comprehensive classification leads to a division of the elevations into three regions: (1) The lower range forming the buttresses of the main masses, and reaching a height of 2500 to 6000 feet; that is, to the extreme limit of the growth of wood. (2) The middle zone lying between the former limit and the snow-line, at the elevation of 8000 to 9000 feet. (3) The high Alps, rising to 15,732 feet. The middle zone forms the region of mountain-pasturages, where the characteristic Alpine dairy-farming is carried on. These pastures consist of a rich carpet of grass and flowers. This threefold division of heights, however, does not everywhere coincide with the same phenomena of vegetation: the line of perpetual snow descends lower on the north side, and the boundaries of the zones above described vary accordingly. (1) The line of demarcation between the region of mosses and alpine plants and that of perpetual snow, is from 8000 to 9000 feet on the northern declivities; but on the southern, it approaches 10,000 feet. (2) The highest limit to which wood attains on the north is about 6000 feet, while on the south it is nearly 7000 feet. (3) Grain, beech, and oak, on the north, disappear at the elevation of 4000 feet; on the south, they contrive to exist some hundreds of feet higher. (4) The region of the vine, as well as of maize and chestnuts, extends to an elevation of 1900 feet on the northern declivity; and on the southern declivity to 2500 feet. The ranges of outlying lower mountains which flank the high central Alps on the north, east, and west, are mostly wanting on the south, especially where the Middle Alps descend into the plains of Lombardy. Thus the Alps rise in steep rocky precipices from the level of the flat plains of the Po, whilst they sink more gradually into the plains on the north; hence their mighty masses, closely piled together, present an aspect from the south more grand and awful; from the north, more extended and various.

Valleys.—The depth of the valleys, and their variety as to form and arrangement, are not less striking than their elevations. Most worthy of notice is the characteristic form of the wide longitudinal valleys that lie at the foot of the high central chains. On the east side, they open directly into the plain; on the north, they are connected with the plain through transverse valleys which often end in lakes. The transverse valleys on the south side are mostly in the shape of steep rocky ravines, forming in some parts long-stretching lakes. Besides the deep-sunk principal valleys, there are extensive series of basin-shaped secondary valleys, which are the scenes of Alpine life, properly so called. Many of the Alpine valleys have names distinct from the rivers flowing through them. Thus, the valley of the Rhone is styled the Upper and Lower Valais; that of the Adda, the Valteline; of the Arve, Chamounix.

Communications—Passes.—The valleys of the high Alps form the natural means of communication. Some are more accessible than others. The entrance into a longitudinal valley is almost always smooth and easy; art has often had to force an entrance into a transverse valley. On many of the high-roads which link the principal with the secondary valleys, it has been found necessary to blow up long ridges of rock, to build terraces, to make stone bridges and long galleries of rock as a protection against avalanches, as well as to erect places of shelter (*hospices*) from storms. The construction of these roads may be reckoned among the boldest and most skilful works of man. In crossing the Alps, several defiles (usually seven) have to be traversed; for in addition to the pass of the main crest, there are other defiles on both sides, at the entrances of the different valleys. In the east, the number of these narrow passes or defiles is considerably increased. The names applied to the Alpine passes vary according to their natural features or the local dialect; as Pass, Sattel (Saddle), Joch (Yoke), Scheideck, Klause, Col, Chiusa. The traveller, in the course of a day's journey, experiences a succession of climatic changes, which is accompanied with an equal variety in the manners of the people.

No lofty mountains in the world are more easily crossed than the Alps; of late years the Mont Cenis, the Brenner, and the St Gotthard railways into Italy from the north afford special facilities. Hence we can understand how the plains of Upper Italy, accessible from the French, German, and Austrian sides, have for ages been the theatre of bloody strife. The passage of the West Alps is made by five principal roads: (1) The military road, La Corniche, a coast-road at the foot of the Alps from Nice to Genoa, parallel to which a railway now runs. (2) The causeway over the Col-di-Tenda, between Nice and Coni, made in 1778; highest point, 6158 feet. (3) The high-road over Mont Genèvre, connecting Provence and Dauphiné with Turin; highest point, 6102 feet. (4) The carriage-road made by Napoleon in 1805, over Mont Cenis, connecting Savoy with Piedmont; highest point, 6848 feet. Near this the chain is pierced by the railway tunnel opened in 1871 (see Tunnel, and Cenis). (5) The pass of the Little St Bernard, connecting Geneva, Savoy, and Piedmont; highest point, 7190 feet. Besides these great roads, there are many smaller ones branching off from them, which form a pretty close network of communication. It has been debated whether Hannibal crossed the Cottian Alps by the Cenis, or the Graian by the Little St Bernard. The passage of the Middle Alps is made by eight principal roads. (1) That of the Great St Bernard, connecting the valley of the Rhone with Piedmont; highest point, 8120 feet. It was crossed by Napoleon in 1800. (2) The magnificent road over the Simplon, constructed by Napoleon, 1801–6,

and connecting the Valais with the confines of Piedmont and Lombardy; highest point, 6595 feet. The project, long in contemplation, of effecting another junction of the Swiss and Italian railways, was realised by the opening in 1906 of a tunnel through the Simplon. (3) Between the Great St Bernard and Monte Rosa is the Matterjoch, connecting Piedmont with the Valais. (4) The pass of St Gotthard, connecting Lucerne with Lago Maggiore; highest point, 6936 feet. The St Gotthard (q.v.) Railway tunnel was opened for traffic in 1882. (5) The Bernardino Pass, made 1819–23, by the Swiss Grisons and Sardinia; highest point, 6769 feet. (6) The Splügen Pass, repaired in 1822, connecting the sources of the Rhine with the Adda. This pass was the one used by the Romans in their intercourse with the countries bordering on the Danube and the Rhine, and also by the German armies in the middle ages. (7) The Wormser Joch, or the Ortler, opened by Austria in 1824. It connects the Tyrol with Lombardy. (8) The Brenner Pass, known to the Romans. It also connects the Tyrol with Lombardy; highest point, 4588 feet. It is now crossed by a railway. Two roads lead north from the Rhone valley, and cross the Bernese Alps, over the Grimsel Pass, 6500 feet high, and the Gemmi Pass, 7553 feet high. The roads over the EAST ALPS are much lower, and much more numerous, than those in the MIDDLE or WEST ALPS. The principal are: (1) The road from Venice to Salzburg, crossing the Noric Alps at an elevation of rather more than 5100 feet. (2) The road over the Carnian Alps, which divides into three branches—to Laibach, to the Isonzo, and to the Tagliamento. (3) The roads from the Danube at Linz to Laibach.

Geology.—The rocks which enter into the composition of the Alps belong to many different geological systems, and occur for the most part as more or less interrupted belts or zones, which extend in the same general direction as the great chain itself—viz. from SW. to NE. The higher and central ranges consist principally of crystalline schists, such as gneiss and mica-schist, with which granite is occasionally associated. These crystalline rocks are flanked on either side by an irregular zone of various sedimentary strata, such as clay-slate, greywacke, &c., along with beds of limestone, dolomite, &c., the fossils in which show that this zone contains representatives of the Silurian, Devonian, Carboniferous, and Permian systems. The Triassic strata, occurring in irregular belts on both sides of the great chain, are developed chiefly in the East Alps, where they comprise massive limestones and dolomites of marine origin, remarkable for their fossils, which show a curious commingling of Palæozoic and Mesozoic forms. Liassic strata are poorly developed in the Alps, but they are noted at Schambelen (Aargau, Switzerland) for their abundant and beautifully preserved insect-remains. The Jurassic system is represented on both sides of the Alps, but is developed chiefly in the low grounds of Switzerland, whence it extends into the Jura Mountains. The Cretaceous system appears in like manner on both sides of the Alps, the most prominent feature of the system being its massive 'hippuritic limestones.' The Eocene is represented most prominently by massive 'nummulitic limestones,' and by certain unfossiliferous sandstones and shales (Flysch), which extend along the northern part of the Alps from the SW. of Switzerland to the neighbourhood of Vienna. The Oligocene and Miocene are best developed in Switzerland, where they form some of the better-known mountains at the foot of the Alps, such as the Righi, the Rossberg, &c. They consist chiefly of conglomerates, sandstones, and similar strata. Patches of sands referable to the Pliocene occur here and there at the base of the Alps in North Italy. The Pleistocene is well represented by a great variety of superficial accumulations, of which the most noteworthy are the ancient moraines, erratics, and perched blocks, fluvio-glacial detritus, and other memorials of the glacial period, together with notable interglacial deposits.

The geological structure of the Alps clearly shows that these mountains are 'mountains of upheaval.' Strange to say, the existing chain occupies the site of very much older mountains which had been elevated towards the close of Palæozoic times, and during a prolonged period had suffered excessive erosion. Subsequently that ancient Alpine land, then greatly reduced, slowly subsided—its more prominent heights enduring for a long period as gradually diminishing islands in the broad Mediterranean of Mesozoic times. The sinking of the land continued, with occasional pauses, throughout the Mesozoic era, so that an immense thickness of sediment eventually accumulated over the slowly subsiding sea-floor. Early in Cainozoic times the ancient Palæozoic Alpine land had been completely submerged, and become buried under many thousand feet of horizontal strata, mostly marine. Late in the Eocene period elevation of the sea-floor supervened, with the result that a broad flat land extended over the site of the present Alps. That crustal movement—one of compression from SE. to NW.—continued into late Tertiary times, and the broad flat land of horizontal strata was buckled up into a great series of mountain-ranges. Instead of a low-lying flat land measuring probably 600 to 1200 kilometres across, we have now a lofty chain averaging no more than 150 kilometres in width. The Alps are a conspicuous example of 'folded mountains' (see MOUNTAINS). Not only have the strata been compressed and flexed and convoluted, but enormous rock-sheets, many square miles in extent, have been displaced and driven successively for miles one over another—great masses of Mesozoic strata, for example, derived from the central and southern Alpine area, have invaded the northern area, and come to rest on strata much younger than themselves. The geological succession has in such cases been inverted, and the mountains carved by erosion out of these travelled rock-sheets are said to be 'without roots.' The Matterhorn and other mountains of the Central Alps are examples of the kind, and the Mythen and many mountains in North Switzerland are similarly 'without roots.'

Since their upheaval, the Alps have suffered excessive denudation. Enormous mountain-masses have been gradually removed by the action of ice, running water, &c. It is therefore often extremely difficult to trace any connection between the present configuration and that which must have obtained when the strata were first squeezed into great undulations. In fact, these mountains are not more an evidence and memorial of the stupendous effects produced by earth-movements than they are of the potency of long-continued denudation. One of the most interesting questions connected with the physical geology of the Alps is that of the origin of the remarkable rock-basins which are occupied by the beautiful lakes of Switzerland and North Italy. By some geologists these rock-basins are believed to be due to unequal movements of elevation or depressions, while others have suggested that they may owe their origin to fractures and dislocations. According to the late Sir A. C. Ramsay, on the other hand, they have been excavated by glacial action. Many geologists now maintain that the great depths attained by not a few of the valleys of the Alps are due to glacial erosion. They point out that the relation of the tributary valleys to the main valleys is abnormal. In the long-established river-systems of

a non-glaciated region, lateral or tributary valleys gradually widen and flatten out as they approach the main valley, but in a highly glaciated area like the Alps the tributary valleys are often abruptly truncated by the main valley. Thus the Rhone valley, which, between Visp and Martigny, is broad and deep, with more or less precipitous sides—a gigantic trench, in fact—is joined by numerous tributaries that shoot down through a succession of abrupt, narrow, and profound gorges. Follow one of these upwards for 800 or 1000 feet, and we find ourselves somewhat suddenly in a relatively wide and open valley. Obviously the latter is truncated or cut across by the deep trench of the Rhone—the over-deepening being attributed to the enormous Pleistocene glacier, the erosive action of which must have been concentrated along the medial line of the great ice-flow.

Mineralogy.—Precious stones are abundant among the crystalline rocks of the central ranges, especially in the region of the St Gotthard. The rock-crystal of St Gotthard has a world-wide reputation. Mining and smelting become more and more productive as we advance eastward. Switzerland is poor in useful ores. Gold and silver are found in Tyrol, Salzburg, and Carinthia; there are also silver-mines in Styria and Illyria, and one near Grenoble. Copper is found in the French Alps, in Tyrol, and Styria. There are well-known lead-mines near Villach. The yield of iron in Switzerland, Savoy, and Salzburg is trifling; Carinthia and Styria produce large amounts; and a considerable quantity of quicksilver is extracted at Idria. The region is rich in salt, especially at Hall and Hallein. Coal is found in Switzerland, in Savoy, and in the French Alps, but in no great quantity; the eastern Alps are richer. The mineral springs, hot and cold, are innumerable. See AIX, ISCHL, LEUK, BADEN, &c.

Animals.—The Alpine mountains present many peculiarities worthy of notice in the animal as well as in the vegetable kingdom (see ALPINE PLANTS). On the sunny heights, the number of insects is very great; the butterflies are especially numerous. The great lakes of the Alps have a restricted, but broadly distributed fauna; they are often very rich in fishes, and salmon and trout are sometimes caught in ponds even 6000 feet above the level of the sea. The frog, newt, black salamander, and other amphibia occur at considerable elevations. Although the lofty mountains are inhabited by eagles, hawks, and various species of owls, yet the birds are few in comparison with the numbers in the plains, and those few are mostly confined to the larger valleys. Among the quadrupeds, the ibex or steinbok, a wild goat, is sometimes, though rarely, to be met with; the chamois is more frequently seen, chiefly in the eastern districts. The marmot (*Arctomys marmotta*) inhabits the upper Alpine regions. The Alpine hare (*Lepus variabilis*), which is white in winter, and the snow mouse or vole (*Arvicola nivalis*) may also be mentioned. Wolves are seen more frequently in the west than in the east; in the latter, on the other hand, bears, lynxes, and wild-cats are found, although constantly diminishing in number. The more characteristic Alpine forms are the survivors of a fauna much more widely distributed in the glacial periods. Of the domestic animals, goats and oxen are scattered everywhere in large herds. There are fewer sheep and horses, and these are not of good breeds. Mules and asses are used more frequently in the south than in the north, especially as beasts of burden. Swine and dogs are not common; the latter are used almost solely by the herdsmen, or are kept in the hospices, to assist in searching for the unfortunate wanderers who may be lost in the snow.

Inhabitants.—The population of the Alpine regions is estimated at 6,000,000 to 7,000,000, of whom perhaps one half are Teutonic, and the other half are of French, Italian, Roumansch (Romanic), or Slavonic origin. Seven states share the Alps. The western portion is divided between France and Italy. Switzerland claims the Middle Alps almost exclusively for her own. Bavaria has only a small share, Liechtenstein a smaller. Austria has the largest, but lost much to Yugoslavia and Italy in 1918–19. The wide valleys opening to the east allow the civilisation of the plains to enter easily among the mountains. The value of the minerals, and the fertility of the soil, have permitted mining, manufactures, and agriculture to take firm root, and a flourishing trade has caused large towns to usurp the place of mere Alpine villages. In the Tyrol, the pastoral life of the mountains has long been mixed up with the working of mines of salt or other minerals. The inhabitants of whole valleys are occupied in various branches of industry to a greater extent than in any other district of the Alps, and their sons travel far and near as artisans. The Alpine mountains are rich in singularly beautiful natural scenery, and attract such crowds of visitors that they have been called 'the playground of Europe' (see ALPINE CLIMBING).

See works by Agassiz, Schlagintweit, Murchison, Tyndall (1860), Conway (1904), Coolidge (1908), and Bonney (1912); also GLACIERS, MOUNTAINS, SWITZERLAND.

Alpujar'ras (Arabic *Al-Busherat*), a name applied to all the valleys lying south of the chief chain of the Sierra Nevada, in the south of Spain.

Alsace-Lorraine (Ger. *Elsass-Lothringen*), till its cession to France in 1919, was a state or 'imperial territory' (*Reichsland*) of the German empire. A naturally rich and historically interesting region, with fertile soil and active industries, it occupies the extreme SW. corner of Germany, and is bounded west by France, east by Baden, and south by Switzerland. Its utmost length from north to south is 123 miles; its breadth varies between 22 and 105 miles; and its area is 5580 sq. m., of which 1353 belong to Upper Alsace (in the south), 1844 to Lower Alsace (NE.), and 2383 to Lorraine (NW.). Pop. (1871) 1,549,738; (1885) 1,564,354, of whom 1,368,711 were natives of Alsace-Lorraine, and 151,755 Germans from other parts of the empire; (1910) 1,874,014, of whom 76 per cent. were Catholics, and more than 87 per cent. spoke German—mainly Alsatian, a dialect of Allemannian. Upper Alsace (Haut-Rhin) had in 1921 468,943 inhabitants, Lower Alsace (Bas-Rhin) 651,686, and Lorraine (Moselle) 589,120—total, 1,709,749. The annexations of 1871 and 1919 were followed by considerable migrations. The French-speaking population is mainly in the larger towns and in Lorraine. The Rhine flows 115 miles north-by-eastward along all the eastern boundary, and receives, below Strasburg, the Ill from Alsace, 127 miles long. Other rivers are the Moselle, flowing through Lorraine past Metz, and its affluent the Saar. Along the Rhine is a strip of level country, 9 to 17 miles broad, and declining from 800 to 450 feet above sea-level. Westward of this rise the Vosges Mountains, culminating at a height of 4677 feet; whilst Lorraine, rather hilly than mountainous, rarely attains 1300 feet. About 48·5 per cent. of the entire area is arable, 11·6 meadow and pasture, and 30·8 under wood. Alsace-Lorraine produces much wine, grain, and tobacco; it is rich in iron and coal; and manufactures potash, petrol, iron, cotton, wool, silks, chemicals, glass, and paper. It contains the important cities of Strasburg, Mülhausen, Metz, and Colmar. As a French province (before 1871), Alsace was divided into the

departments of Haut-Rhin and Bas-Rhin. Lorraine fell into the departments of Meuse, Moselle, Meurthe, and Vosges (parts of which remained French). A representative constitution was granted in 1911, the governor (*statthalter*) being supported by a diet of two chambers, the first containing representatives of various interests (religions, chambers of commerce, &c., with nominees of the emperor), the second sixty elected members.

In Cæsar's time Alsace-Lorraine was part of Celtic Gaul, but during the decline of the Roman empire the Alemanni and other Germanic tribes occupied it. From the 10th century it formed part of the German empire, under various sovereign dukes and princes, till a part of it was ceded to France at the peace of Westphalia (1648), and the rest fell a prey to the aggressions of Louis XIV., who seized Strasburg (1681) by surprise in time of peace. By the peace of Ryswick (1697), the cession of the whole was ratified. Thus—as the Germans used to complain—was this fine land, with one of the noblest branches of the race, alienated from the German people, and the command of the German Rhine disgracefully surrendered to the enemy in the time of misfortune. German never ceased to be the chief language of the people, and all newspapers were, during the whole period of the French possession, printed in both languages. In 1814–15 Russia would not hear of the restitution of Alsace-Lorraine to Germany; and it was not till 1871, after the Franco-German war, that Alsace and German Lorraine were, by the treaty of Frankfort, incorporated in the new German empire. The great mass of the population were strongly against the change, and 160,000 elected to be French, though only 50,000 went into actual exile, refusing to become German subjects. For, at least since the era of the Revolution, Alsace in sentiment was wholly French. To France she gave the bravest of her sons—Kellermann, Kléber, and many another hero. Strasburg first heard the *Marseillaise;* and MM. Erckmann-Chatrian, Lorrainers both, faithfully represented their countrymen's love of *La Patrie* in the days of the second as of the first Napoleon. France, too, was always thinking of her loss, eager some day to repair it; and the imperial territory, for ages the borderland and battlefield of two great powers, remained a perpetutal cause of strained relations between France and Germany. Of late it is claimed by the Germans that, through the emigration of the irreconcilables and the immigration of German settlers, the tendency of the older natives to accept the inevitable, and the rising up of a new generation to whom the French connection was a tradition, the situation had changed in favour of Germany and the existing firm but fair administration. The irritating passport system, a special grievance not in force elsewhere in Germany, was withdrawn in 1893. By the treaty of Versailles (1919) the territory was ceded to France, within the boundaries of 1871. See works by Grad (1889) and Matthis (1890), on folklore by Gaidoz and Sebillot (1883), on songs by Weckerlin (1883). For the history of Lorraine, see LORRAINE.

Alsatia, a cant name applied to the precinct of Whitefriars, which, until 1697, enjoyed the privilege of a debtors' sanctuary, and hence was crowded with swindlers and bullies. The name is first met with in 1623. Shadwell's comedy, *The Squire of Alsatia* (1688), is Scott's authority for some of the finest scenes in the *Fortunes of Nigel.*

Alsen, an island in the Baltic, off the coast of Sleswick. Formerly Danish, it became Prussian in 1864, Danish again by plebiscite in 1920. Its greatest length is 19 miles; its greatest breadth 12; and its area is 121 sq. m. Pop. 25,000, almost all Danish-speaking. The island, one of the finest in the Baltic, has a picturesque appearance, is very fertile, with rich woods, and numerous lakes abounding in fish. The chief town is Sonderborg, with an excellent harbour, and a population of 10,000.

Alster, a river in Holstein, is formed by the confluence of three streams, and, in the neighbourhood of Hamburg, spreads itself out, and forms a lake, called the Great or Outer Alster, and within the town, the Inner Alster. It flows by several canals into the Elbe.

Alstrœme'ria, or *Alströmer's Lily,* a genus of Amaryllidaceæ (q.v.), cultivated for its flowers and curiously twisted leaves, which have the upper in the normal position of the lower surface. Some have climbing or twining stems; amongst these is the beautiful salsilla (*A. salsilla*), a native of Peru, which is cultivated in the West Indies, and its tubers eaten like those of the potato. In Britain, it requires the stove or a hot-bed. *A. ovata,* also a beautiful plant, with a slender twining stem and ovate leaves, is cultivated in Chili for its tubers, which weigh 3 to 6 ounces, and are used as food. A kind of arrowroot is also prepared in Chili from the succulent roots of *A. pallida* and other species.

Altai, the Ghin-shan or Golden Mountains of the Chinese, is the name given to a wild mountainous region which covers the southern parts of Tomsk, in Siberia, and partly extends into Mongolia. It comprises the mountainous border-region of the great plateau of Central Asia, between the Tian-shan and the Sajan Mountains, and consists of two separate parts—the Altai proper, belonging to Siberia; and the Great Altai, in Outer Mongolia. The former covers with its numerous intricate chains and their spurs a surface thrice as large as Switzerland. Although occupied by the Russians since the 17th century, its orography and structure are but imperfectly known. A huge mountain-ridge, the Sailughem, which separates Russia from China, is the border-ridge of the Central Asian plateau; it is continued to the SW. as the high but yet unexplored ridge of West Sajan, which fringes the plateau in the basin of the Yenisei. Its summits reach a height of from 7000 to 9000 feet. It is pierced in the SW. by the deep depression of Lake Zaisan, which gives an easy access to the high plateau of Central Asia. A series of no less than three different chains fringes the Sailughem ridge towards the NW. Some of these chains are snow-clad, and their highest summit, Byelukha, reaches the height of 17,800 feet; while many others seem to reach 14,000 feet. Granites, syenites, and partly also porphyries covered with crystalline slates, as also with Silurian, Devonian, and Carboniferous deposits, constitute the mountains. Deep and wild gorges, immense glaciers, beautiful alpine lakes (the Teletsk, 1600 feet above the sea), and fertile alpine valleys (like the Bukhtarma Valley, 190 miles long), render the Altai a most attractive alpine region. The valleys on its outskirts are being rapidly colonised by Russian agriculturists, who find an easy living in the fertile soil and the rich sub-alpine meadows. The gold-washings of the Altai, and its silver, lead, copper, iron, and coal mines, are another source of wealth. A few Kalmucks, Teleutes, and Kumandintses represent a formerly denser and more civilised population, all of Ural-Altaic stock. Barnaul (34,000 inhabitants) is the chief centre of administration. The Great Altai is a high chain of mountains running from NW. to SE., from Lake Zaisan to the central parts of the Gobi, and bordering the Urumtsi depression. See ASIA; and Turner's *Siberia* (1905).

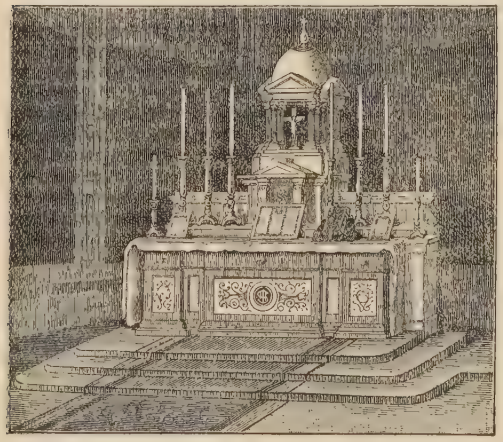
Altamira, in NW. Spain near Santander, is noted for its great cave, adorned with truthful and

spirited Palæolithic paintings in three colours of bisons, boars, and other animals. See ANTHROPOLOGY, ARCHÆOLOGY.

Altamu'ra, a town of South Italy, 28 miles SW. of Bari, near the base of the Apennines. Its fine cathedral dates from 1220. Pop. 25,000.

Altar (Lat. *altare*, from *altus*, 'high'), the place whereon offerings were laid both by Jews and heathens. The first on record is that which Noah built on leaving the ark. The Israelites, after the giving of the Law, were commanded to make one. Both in the Jewish tabernacle and temple there were two altars, one for sacrifices, and another for incense. The Jewish and oriental altars were generally either square or oblong; those of Greece and Rome, on the other hand, were often round. Sacrifices were offered to the infernal gods, not on altars, but in cavities dug in the ground (see SACRIFICE).

The word has been transferred into the Christian system. For upwards of five centuries, altars in the Christian churches were for the most part made of wood, and an altar of this kind is still to be seen in St John Lateran's at Rome. But the custom of celebrating the liturgical service on the marble sepulchre of the martyrs in the catacombs, led to the introduction of stone altars; and in a council held at Epone in France, 509 A.D., it was decreed that none should be consecrated with chrism except those built of stone. In the Roman Catholic Church, the rubrics require that all altars should be of stone, but the stone itself may be only large enough to hold the host and chalice, and the slab, perhaps no more than a foot square, may rest on, or be inserted in, a board of wood. Such a stone may with license be used as a 'portable altar' by priests requiring to say mass on a journey or in private houses. The stone must in all cases be provided with relics inclosed within it, and be consecrated by a bishop. The altar must be covered with three cloths, one of which must reach to the ground. It should also, if possible, have attached to it in front a 'pallium,' or frontal, varying in



High Altar:
Church of the Sacred Heart, Edinburgh.

colour according to the feast or season. The essentials of the altar for mass in Roman Catholic churches are the altar itself, the altar cloths, the missal, the three cards (containing portions of the missal), the tabernacle for the reservation of the host, and the crucifix. In the throne above the tabernacle, the host is occasionally exposed in a vessel called the Monstrance (q.v.), as at the service of the 'Benediction;' the crucifix being removed. The crucifix must stand upon or above the altar, between two candles. The missal is moved from side to side of the altar at various parts of the mass. The epistle is read from the right side, and the gospel from the left; hence it is customary to speak of the epistle and gospel sides of the altar. The Credence Table (q.v.) and the Piscina (q.v.) are adjuncts of an altar.

In the first ages of Christianity, there was only one altar in a church; but, from a very early time, the Latins have used more than one. The principal altar is called the high altar. In the 12th century, the adorning of churches with numerous altars was carried to a great extent, and they were embellished with gold, silver, and precious stones. The Greek Church use but one altar. Altars were frequently placed at the west end of the ancient churches (as in the old British Church), instead of the east. The only perfect altar of the old times in England is the high altar of Arundel church, Sussex. The slab is 12 feet 6 inches long, by 4 feet wide, and 2½ inches thick; the support is of solid stone, quite plain. For 300 years after the time of Christ, the word altar was constantly used to describe the table of the Lord; subsequently 'table' and 'altar' were used indifferently. In the first Prayer-book of King Edward (1549), the word altar was used in the rubric, and the Lord's Supper was still called the Mass; but in 1550, an order was issued for the setting up of tables instead of altars, and in the second Prayer-book of 1552, the word 'altar' was everywhere superseded by 'table:' though 'altar' is retained throughout the coronation service. The table was further ordered to be of wood, and movable. In Mary's reign the altars were re-erected; but in Queen Elizabeth's, some were riotously pulled down, and injunctions were then issued directing that this should not be done, except under the oversight of the curate and at least one churchwarden. It was charged against Archbishop Laud that he had converted communion-tables into altars. What he really did was to remove the tables out of the body of the church, and place them 'altarwise'—i.e. north and south, at the upper end of the chancels, where the altars formerly stood; and a dog having on one occasion run away with a piece of the consecrated bread, he directed that rails should be erected to prevent such desecration in future. By the judgment in the Arches Court, 1845, in the case of Faulkner *v.* Litchfield, it was decided that altars may not be erected in churches. This case arose out of the erection, by the Cambridge Camden Society, of a stone altar in the Church of the Holy Sepulchre in that town; but it may be questioned whether this judgment has not been virtually modified by the subsequent action of the English Church, and the indirect effect of the judgments of the same court, and of the privy council in the case of Sheppard *v.* Bennet in 1870–1.

Bowing towards the altar is an ancient practice of the church, a mark of homage offered to the seat of the presence of Christ in Holy Communion. Among Roman Catholics, it is the custom to genuflect before the altar when the host is reserved in the Tabernacle (q.v.).

The doctrine of Sacrifice is fully discussed under that head. See LIGHTS (USE OF), BALDACHIN, RITUALISM.

Altazimuth (a contraction for *altitude and azimuth instrument*), an astronomical instrument for determining the apparent places of the heavenly bodies on the celestial sphere. It consists of a telescope revolving about a horizontal axis, which in turn revolves about another vertical axis, the angle of revolution being measured in each case by a divided circle. These angles give the Altitude (q.v.) and Azimuth (q.v.) of the heavenly body

observed at the instant of observation, and so indicate its place. Small instruments of this kind are used in surveys. The principal one in existence is that at Greenwich, designed by Sir George Airy, the object of which was to supplement the lunar observations taken on the meridian by the Transit Instrument (q.v.) by others taken when the moon was in other parts of the sky. Its two chief principles of structure are, that as many parts as possible are cast in one piece, and that no power of adjustment is provided anywhere; the errors of construction and original adjustment being allowed for in the reduction of the observations. By means of this instrument much has been gained in knowledge of the moon's places, the observations made with it, owing to its freedom of pointing to any part of the heavens, exceeding in number those obtained by the fixed meridional instruments in the proportion of 16 to 9. The altazimuth is not, however, in general use, owing to its liability to many errors, unless, as at Greenwich, most carefully and solidly designed and constructed.

Altdorf. See ALTORF.

Altdorfer, ALBRECHT (1480?–1538), painter, engraver, and architect, was born at Ratisbon, and may have been a pupil of Dürer; at any rate, he belongs to that religious school of artists of which Dürer was the head. His pictures are animated by a romantic and poetic spirit; and the landscape is delineated with the same truth and tenderness as the figures. His masterpiece, now in Munich, is 'Alexander's Victory over Darius.' As engraver, Altdorfer is reckoned among the 'Little Masters.' See Sturge Moore, *Altdorfer* (1900).

Alte'a, a Spanish seaport, 25 miles NE. of Alicante. The harbour is good. Pop. 6000.

Alten, KARL AUGUST, COUNT OF, Hanoverian general, born in 1764, entered the army in 1781, but in 1803 left Hanover for England, where he was made commander in the German Legion. In almost all the engagements of the Spanish war of liberation he took a prominent part; and he fought with distinction at Quatre-Bras and Waterloo. After his return to Hanover, he was made minister of war. He died April 20, 1840.

Al'tena, a town of Prussia, in the district of Arnsberg, 47 miles NW. of Siegen by rail, in a deep and picturesque valley. It manufactures needles, pins, and hardware. Pop. 15,000.

Altenburg, a town of Thuringia, capital of the former state of Saxe-Altenburg, on the Pleisse, 30 miles S. of Leipzig, has a famous old castle on a steep rock of porphyry. Hence in 1455 a neighbouring knight, Kunz von Kaufungen, carried off two young Saxon princes (the 'Prinzenraub'); but before he could reach the Bohemian frontier, he was apprehended by a charcoal-burner, and handed over to the executioner. Pop. 40,000.

Altendorf, a group of manufacturing villages incorporated with Essen (q.v.). Krupp has ironworks here, and there are manufactures of coke, brick, and cement.

Altenessen, a town 2 miles N. of Essen (q.v.), of which it is now part, with coal-mines and machine-works.

Altengaard, a hamlet in Finmarken, the northernmost province of Norway, situated on the south side of the Alten Fiord, in 69° 55′ N. lat. Beyond this point, no cultivation is attempted; and even here, potatoes and barley alone are produced. There is here a meteorological and magnetic station.

Altenstein, KARL, BARON VON STEIN ZUM, a Prussian statesman, born at Ansbach, October 7, 1770. In 1808 he became the head of the department of finance, and in 1817 was made minister of public worship and education. He had much to do with founding the universities of Berlin and Bonn. He died at Berlin, May 14, 1840.

Alteratives, in Medicine, a term applied to remedies that 'improve the nutrition of the body without exerting any very perceptible action on individual organs' (Lauder Brunton). This group includes a number of substances of the most diverse characters and properties, having this only in common, that their mode of action is obscure, though its results are often of the greatest value. In fact 'we use the word alteratives very much as a cloak for our ignorance.' It has been suggested, that alteratives act either by modifying the action of the ferments in the body, or by replacing the normal constituents of the tissues by others with different properties. Among the most important alteratives are various preparations of arsenic, mercury, iodine, phosphorus, gold; cod-liver oil, colchicum, guaiacum, sarsaparilla. Many of them are violent poisons when taken in improper doses. As examples of their action, may be cited the beneficial effect of mercury and iodides in the various morbid processes of syphilis; of cod-liver oil and iodides in tuberculous diseases; of arsenic in inflammations of the skin.

Alternation. See GENERATIONS (ALTERNATION OF).

Althæa. See MARSH MALLOW, HOLLYHOCK, MALVACEÆ.

Althorn. See SAXHORN.

Althorp. See SPENCER.

Altitude, in Astronomy, is the height of a heavenly body above the horizon. It is measured, not by linear distance, but by the angle which a line drawn from the eye to the heavenly body makes with the plane of the horizon, or by the arc of a vertical circle intercepted between the body and the horizon. Altitudes are taken in observatories by means of a telescope attached to a graduated circle (see CIRCLE), which is fixed vertically. The telescope being directed towards the body to be observed, the angle which it makes with the horizon is read on the graduated circle. The altitude thus observed must receive various corrections—the chief being for Parallax (q.v.) and Refraction (q.v.)—in order to get the true altitude. At sea, the altitude is taken by means of a Sextant (q.v.), and then it has further to be corrected for the dip of the visible horizon below the true horizon (see HORIZON). The correct determination of altitudes is of great importance in most of the problems of astronomy and navigation (see LATITUDE and LONGITUDE). — An ALTITUDE AND AZIMUTH INSTRUMENT, called by contraction ALTAZIMUTH (q.v.), consists essentially of a vertical circle with its telescope so arranged as to be capable of being turned round horizontally to any point of the compass. See AZIMUTH.

Alto, in Music, is properly the same as Counter Tenor (q.v.), the male voice of the highest pitch (now principally falsetto), and *not* the lowest female voice, which is properly contralto, though in printed music the second part in a quartet is always entitled *alto*. See CONTRALTO.

Alton, a town of Hampshire, 8¾ miles SW. of Farnham. Its Perpendicular parish church was thoroughly restored in 1867. Hops are grown in the neighbourhood, and there are large breweries in the town. Pop. 5600.

Alton, a city and port of entry of Illinois, U.S., on the left bank of the Mississippi River, 24 miles N. of St Louis, and 8 miles above the mouth of the Missouri. Laid out in 1817, and since 1868 the seat of a Catholic bishopric, it is a centre of

commerce, and has a Baptist college (1836), several mills and manufactories, and an abundant supply of limestone. Pop. 25,000.

Al'tona, the largest and richest city in the Prussian province of Sleswick-Holstein, is situated on the steep right bank of the Elbe, just below Hamburg, so that the two cities are divided only by the state-boundaries. Altona lies higher than Hamburg, and is much healthier; but, in a commercial point of view, the two may be almost regarded as forming a single city. The trade is largely with America. There are many important industrial establishments in Altona, such as cotton and woollen mills, tobacco and soap factories. The celebrated observatory, founded by Schumacher in 1823, was transferred to Kiel in 1874. Of public buildings, the most notable are the churches of the Trinity (1743) and St John (1873); and of monuments, one to the governor, Von Blücher (1832). Invested by the Danish king with special privileges in 1664, as rival to Hamburg, and burnt by the Swedes in 1713, Altona was annexed to Prussia in 1866. Its population and area have increased rapidly —(1840) 28,095; (1860) 45,524; (1885) 104,719; (1890) 143,249; (1910) 172,628; (1919) 168,729.

Altoona, a city of Pennsylvania, U.S., at the eastern base of the Alleghanies, 117 miles E. of Pittsburg. It contains large locomotive-works and machine-shops in connection with the Pennsylvania Railroad. Near Altoona is a remarkable triumph of railway engineering, known as the 'Horseshoe Bend.' Pop. (1870) 10,610; (1900) 38,973; (1910) 52,127; (1920) 60,331.

Altorf, or ALTDORF, the chief town in the Swiss canton Uri, is situated in a sheltered spot at the base of the Grünberg, at the head of the Lake of Lucerne. The little tower on which the legendary exploits of William Tell are painted in rude frescoes is of dubious antiquity. Situated on the St Gothard road and railway, Altorf has some transit trade. Pop. about 3000.—The old town of ALTORF, or ALTDORF, in Middle Franconia (pop. 4000), was the seat of a university from 1623 to 1809.

Alto-rilievo (Ital., 'high relief'), in Sculpture, used of figures projecting from the background on which they are carved, by at least half their thickness; so called as distinguished from *basso-rilievo* ('low relief'), and *mezzo-rilievo* (see RELIEF, SCULPTURE). The Elgin Marbles (q.v.) comprise the most notable high reliefs.

Altötting, a very ancient place of pilgrimage in Upper Bavaria, not far from the river Inn. The chapel, said to have been built on the site of a heathen temple, contains the famous black image of the Virgin Mary, dating from the 8th century, and an extraordinarily rich treasure of gold, silver, and precious stones. Another chapel contains the tomb of Tilly. Pop. 5300.

Al'trincham, an urban district of Cheshire, England, on Bowdon Downs, 8 miles SW. of Manchester by rail, is situated on the Bridgewater Canal. Its mayor is appointed annually, under an old charter, by the lord of the manor; but he has no jurisdiction, his chief duties being to open fairs and administer some funds left to the town three centuries ago. It is a very neat and clean town, and on account of the salubrity of the air, is much resorted to by invalids from Manchester. It has manufactures of artificial manures, and an iron-foundry; but a chief employment of its inhabitants is the raising of fruits and vegetables for the market of Manchester. Pop. (1851) 4488; (1871) 8478; (1911) 17,813; (1921) 20,461.

Altruism is the English form of the Fr. *altruisme*, a word formed by Comte from the Ital. *altrui*, 'of or to others;' and, introduced into English by the translators and followers of Comte, has gradually come into more general use. It is opposed to egoism or selfishness, and means unselfishness or devotion to the welfare of others as a principle of action or an element of character. See ETHICS, UTILITARIANISM, &c.

Alum, a white, saline substance, with a sweetish, astringent taste, is, properly speaking, a double salt, being composed of sulphate of potash and sulphate of alumina, which, uniting together along with a certain proportion of water, crystallise in octahedrons or in cubes. Its formula is $K_2SO_4Al_2(SO_4)_3 24H_2O$. Alum is soluble in eighteen times its weight of cold water, and in its own weight of hot water. The solution thus obtained is strongly acid to coloured test-papers. When heated, the crystals melt in their water of crystallisation; and when the water is completely driven off by heat, there is left a spongy white mass, called *burnt alum* or anhydrous alum. Alum is much used as a mordant in dyeing. This property it owes to the alumina in it, which has a strong attraction for textile tissues, and also for colouring matters; the alumina thus becomes the means of fixing the colour in the cloth. The manufacture of the colours or paints called lakes depends on this property of alumina to attach to itself certain colouring matters. Thus, if a solution of alum is coloured with cochineal or madder, and ammonia or carbonate of soda is added, the alumina of the alum is precipitated with the colour attached to it, and the liquid is left colourless. Alumina, the basis of pure clay—which is a silicate of alumina—derives its name from being first extracted from alum. Alum is also used in the preparation of leather from skins, and, in medicine, as a powerful astringent for arresting bleeding and mucous discharges. Its use to impart whiteness to bread made from poor flour is highly objectionable.

Alum rarely occurs in nature, except in a few springs and in some extinct volcanoes, where it appears to be formed from the action of sulphurous acid vapours upon felspathic rocks. In this country it is prepared artificially from alum-shale, obtained from coal-mines at Hurlet and Campsie, near Glasgow; and from alum-slate, which occurs at Whitby, in Yorkshire. The alum-slate, shale, or schist consists mainly of clay (silicate of alumina), iron pyrites (bisulphuret of iron), and coaly or bituminous matter. When the shale is exposed to the air —as it is in the old *coal-wastes* or mines from which the coal has been extracted—the oxygen of the air, assisted by moisture, effects a decided change upon it. The original hard stony substance begins to split up into thin leaves, and becomes studded over and interspersed with crystals. The latter are the result of the oxidation of the sulphur of the pyrites into sulphuric acid, and the iron into oxide of iron, both of which in part combine to form sulphate of iron, whilst the excess of the sulphuric acid unites with the alumina of the clay, and produces sulphate of alumina. When the alum-shale thus weathered is digested in water, there dissolve out the sulphate of alumina, $Al_2(SO_4)_3$, and sulphate of iron, $FeSO_4$; this solution is treated with chloride of potassium, KCl, which decomposes the sulphate of iron, forming sulphate of potash, K_2SO_4, and dichloride of iron, $FeCl_2$. When this liquid is evaporated to concentration, and allowed to cool, crystals of alum, leaving the composition above described, separate out, and the protochloride of iron is left in the solution or *mother-liquor*. The crystals of alum obtained from the first crystallisation are not free from iron, and hence require to be redissolved in water, reconcentrated, and recrystallised. This operation is generally repeated a third time before the alum is obtained pure.—As the preliminary weathering of the shale takes some years

to complete, a more expeditious method is now largely resorted to. The shale is broken in fragments, and piled up over brushwood in long ridges shaped like huge potato-pits, and the brushwood being set fire to, the coaly matter of the shale begins to burn, and the whole ridge undergoes the process of roasting; the results of which are the same as that of the weathering operation—namely, the oxidation of the sulphur and iron, and the formation of sulphate of alumina and sulphate of iron. This material is afterwards worked up as previously described. The roasting operation is so much more expeditious than the weathering process, that months suffice instead of years. Alum is also largely manufactured from its constituents by direct combination. Clays are calcined as pure as possible from iron and calcium carbonate, and dissolved in dilute sulphuric acid. The aluminium sulphate formed is crystallised into alum by the addition of potassium sulphate. It is made near Edinburgh in this way, from the ashes of coal. The alum made at Tolfa, near Civita Vecchia, is extracted from alum-stone, a mineral containing sulphate of potash and sulphate of alumina, but united in such a form as to render them insoluble. When the mineral is calcined, the sulphates become soluble, and are extracted by lixiviation. The alum thus manufactured (*Roman alum*) crystallises in opaque cubes, having a reddish tint, due to the presence of iron. The potash in alum can be replaced partly or altogether by soda or ammonia; and other replacements can also be made. Thus there are soda, ammonia, chrome, iron, &c. alums. The more important members of the class are:

$K_2SO_4,Al_2(SO_4)_3,24H_2O$, potash alum.
$Na_2SO_4,Al_2(SO_4)_3,24H_2O$, soda alum.
$(NH_4)_2SO_4,Al_2(SO_4)_3,24H_2O$, ammonia alum.

Alum-Bagh (*Alambágh*), a fort rendered famous during the Indian mutiny in 1857. It was a domain about 4 miles from the city of Lucknow, and comprised a palace, a mosque, and a park; and was converted by the rebels into a fort. It was taken by the British forces in September; and on evacuating Lucknow, Sir Colin Campbell left Sir James Outram with 3500 men to hold the Alum-Bagh. He was surrounded by the insurgent forces of 30,000 sepoys and 50,000 volunteers, and was repeatedly attacked by them, but in vain. In March, Sir Colin Campbell reconquered Lucknow, and relieved the Alum-Bagh from its perilous isolation. Havelock had been buried within the walls in November 1857.

Alu'mina, the most abundant of the Earths (q.v.), is the oxide of the metal Aluminium (q.v.), the formula being Al_2O_3. It occurs in nature abundantly in combination with silica, associated with other bases. The most familiar of its native compounds is felspar, a silicate of alumina and potash, $K_2O,Al_2O_3(SiO_2)_6$. This is one of the constituents of granite, and of several other igneous rocks. Certain varieties of these, by exposure to the atmosphere, become completely disintegrated, passing from the state of hard, solid rock, such as we are accustomed to see in building-granite, into soft, crumbling, earthy masses. It is the felspar which undergoes the change; and it appears to be owing to the action of rain-water charged with carbonic acid, which dissolves the potash and some of the silica of the felspar, leaving the excess of silica and the alumina still united. It is not known, however, why certain specimens of granite are rapidly corroded and crumbled down, whilst others have resisted for ages the same causes of decay. By such a process of disintegration as we have described, the clays of our arable soils are produced. Clay consists of silica and alumina in a state of chemical combination. It never is pure alumina, but the quantity of silica united to the latter is variable. When it is pure, clay is quite white, as we see in the porcelain clay of Devonshire and Cornwall, which is derived from colourless felspar. More frequently, clay is red, owing to the presence of oxide of iron; or black, from the diffusion through it of vegetable matter.

From alum, alumina is prepared by adding to a solution of the former, water of ammonia, as long as it occasions a precipitate. The alumina appears as a voluminous, white, gelatinous substance, consisting of the oxide of the metal combined with water. When alumina is precipitated from a solution containing colouring matter, such as logwood, &c., it carries down the colour chemically united to the flocculent precipitate; in this way are formed the coloured earths called *Lakes* (q.v.). Alumina in the state of precipitate, after being gently dried, is readily soluble in acids and in alkalies; but if strongly heated, at a certain temperature it presents an appearance of sudden incandescence, it loses the associated water, contracts greatly in bulk, and now forms a white, soft powder, not at all gritty, and with difficulty soluble in alkalies and acids. Alumina, as generally prepared, whether hydrated or anhydrous, is insoluble in water, possesses no taste, and does not alter colouring matters; but it has also been obtained in an allotropic hydrated form, which, in the presence of a very small proportion of acetic acid, is largely soluble in water, from which a minute trace of sulphuric acid precipitates it. It is quite different, therefore, in properties from the alkaline earths, and is a much weaker base. In the anhydrous state it absorbs water with great readiness without combining with it, so that it adheres to the tongue, and is felt to parch it. Clay retains this property; and the ends of tobacco-pipes are often glazed, to prevent adhesion to the lips or tongue. Alumina is not fusible by a forge or furnace heat, but it melts before the oxyhydrogen blowpipe into a clear globule, possessing great hardness. It occurs in nature in a similar state as Corundum (q.v.). The more coarsely crystallised specimens form the emery used for polishing; the transparent crystals, coloured by a trace of metallic oxide, constitute the precious gems sapphire, ruby, oriental amethyst, and oriental topaz. Alumina, like other sesquioxides, is a feeble base.

Alumin'ium—sym. Al, eq. 27—is one of the metals present in clay, felspar, slate, and many more rocks and minerals. It was named about 1812 by Davy, who dissolved alumina, but failed to isolate the metal. It was isolated by Wöhler in 1828, and was re-examined by him in 1846, when he obtained the metal in minute globules or beads, by heating a mixture of chloride of aluminium and sodium. In 1855, the French chemist Deville showed, as the result of a series of experiments, that aluminium could be prepared on a large scale and in a compact form without much difficulty. The mineral cryolite found in Greenland, which is a double fluoride of aluminium and sodium, was the ore first used for its manufacture; but bauxite, a clay first found at Les Baux, near Arles, consisting chiefly of alumina or oxide of aluminium, and oxide of iron, has since been employed as a more convenient source of the metal. An aluminate of soda is first obtained by heating the bauxite with soda ash in a furnace, and separating it (the aluminate) from the insoluble portions by lixiviation. When carbonic acid is passed through the solution, pure alumina is thrown down. The alumina is then formed into balls with common salt and charcoal, which are heated in an earthenware retort through which chlorine gas is passed. In this part of the process,

the charcoal combines with the oxygen, and the chlorine with the aluminium; the latter sublimes over with the common salt (chloride of sodium), and is collected as a double chloride of aluminium and sodium. When this double chloride is heated in a reverberatory furnace with fluxes and metallic sodium, the latter seizes the chlorine combined with the aluminium, which is then set free, and falls to the bottom ready to be cast into ingots for use. Aluminium has also been made from alum. In the Cowles apparatus a mixture of clay (such as bauxite) and charcoal is subjected to the heat of the electric arc and the alumina reduced. As far back as 1854 Bunsen accomplished the manufacture by a somewhat troublesome and expensive electrolysis. But since 1890 electrolytic methods have largely superseded the chemical processes. Hall and Héroult introduced the method of fusing cryolite by an electric current, and adding powdered alumina, which is electrolysed. Advantage is largely taken of the electricity generated by means of waterfalls —as at Neuhausen, near the Schaffhausen falls of the Rhine, and in Norway. The Niagara Falls are employed in the same way; and bauxite from the north of Ireland is the material worked on at the aluminium-works below the Falls of Foyers. Other methods treat kaolin or labrador stone with an acid, and precipitate the metal from the salt thus formed by ammonia or by a suitable temperature.

The properties of aluminium are, that it is a white metal, somewhat resembling silver, but possessing a bluish hue, which reminds one of zinc. This bluish colour can be whitened by hydrofluoric and phosphoric acids, and also by a heated solution of potash. It is very malleable and ductile, in tenacity it approaches iron, and it takes a high polish. It fuses at about 1292° F. (700 C.), and can then be cast in moulds into ingots. Exposed to dry or moist air, it is unalterable, and does not oxidise or tarnish like most common metals. Neither cold nor hot water has any action upon it. Sulphuretted hydrogen, the gas which so readily tarnishes the silver in households, does not act on aluminium, which is found to preserve its appearance under all ordinary circumstances as perfectly as gold does. When cast into moulds, it is a soft metal like pure silver, and has a density of 2·56; but when hammered or rolled, it becomes as hard as iron, and its density increases to 2·67. It is therefore a very light metal, being lighter than glass, and only one-fourth as heavy as silver. Aluminium is very sonorous, a bar of it when struck giving out a very sweet clear ringing sound. It is a good conductor of heat and electricity.

Notwithstanding its many valuable properties, it was for long little in demand. From about 1850 many articles were made, but failed to take the market. It is used for optical, surgical, electrical, and chemical instruments and apparatus. Aluminium leaf and wire may be employed with great advantage in place of silver leaf for decoration, or silver wire for embroidery. Of late it has come to be used in shipbuilding, especially for torpedo-boats, and boats meant to be sent in pieces to African lakes, &c.; for making airships and aeroplanes; for bicycles; and in general for machinery and structures in which the hardness and lightness and non-corrosiveness of aluminium and its alloys are in its favour. And as it is specially suitable for cooking-vessels, efforts to cast it for pots and pans were often made, but unsuccessfully till 1895, when aluminium was, weight for weight, three times the price of copper, but, bulk for bulk, the cheaper metal. It is used in lithography and in welding; and the high explosive ammonal makes use of the great heat of its combustion.

Aluminium Alloys.—Aluminium forms, with copper, several light, very hard, white alloys; also a yellow alloy, which, though much lighter than gold, is very similar to it in colour. This gold-like alloy, which is ordinary aluminium bronze, contains from 5 to 10 per cent. of aluminium, and is very strong, was discovered by Dr Percy of London. For many years it has been manufactured into watch chains, pencil-cases, and other small ornamental articles. More lately it has been made on a limited scale into such articles as table-plate and carriage mountings, which have an attractive appearance. This bronze, which can be made with a tensile strength equal to steel, has certain advantages for field-guns. Its anti-friction and wearing qualities make it well adapted for bearings of shafts; but its price, considerably in excess of ordinary bronze, somewhat hinders its use on a large scale for objects of utility.

An alloy of aluminium and tin is used for optical instruments, and from another of aluminium and silver called 'Tiers Argent,' excellent spoons and forks are made. Magnesium alloys of aluminium such as magnalium are valuable for hardness and strength.

Alum Root. This name is given in the United States to two plants, natives of that country, very different from one another, but agreeing in the remarkable astringency of their roots, which are medicinally used. One of these plants is *Geranium maculatum* (see GERANIUM). The root contains more tannin than Kino (q.v.) does. The property of astringency belongs, in an inferior degree, to some other species of Geranium, and of the kindred genera, Erodium and Pelargonium.—The other American plant to which the name alum root is given is *Heuchera americana*, a plant of the natural order Saxifragaceæ (q.v.), an order in which also astringency is a prevalent property. The root is a powerful styptic, and is used to form a wash for wounds and obstinate ulcers.

Alunno, NICCOLO, or Niccolo of Foligno, one of the earliest of the old Umbrian painters, was born at Foligno about 1430. His early works were all frescoes, and his subjects were mainly religious. Alunno is not so remarkable for the fertility of his invention as for his warmth of feeling, purity, and devout faith; and may be accounted a worthy predecessor of Perugino.

Alured, or ALFRED, of Beverley, in Yorkshire, an old English historian of the time of Henry I. Little is known regarding him, save that he was treasurer and sacrist of the church of Beverley, where he wrote his *Annales*, in nine books. This work commences with the fabulous period of British history, and extends down to the year 1129. It is a mere rechauffé of Geoffrey of Monmouth, Bede, and Henry of Huntingdon. Written apparently about 1143, it was published at Oxford in 1716 by Thomas Hearne.

Alva, a police burgh in Clackmannanshire (in a district accounted till 1891 a detached part of Stirlingshire), at the base of the Ochils, 7¾ miles ENE. of Stirling by rail, is a place of great industrial activity, having extensive woollen-factories, in which the manufacture of shawls and tweeds has superseded that of blankets. To the east of the village is the Silver Glen, where two pits still mark the site of old silver-mines, opened about 1712. Immediately behind the village is Alva Glen, noted for its picturesque beauty and magnificent waterfall. Pop. 4000.

Alva, or ALBA, FERDINAND ALVAREZ DE TOLEDO, DUKE OF, prime minister and general of the Spanish armies under Charles V. and Philip II., was born in 1508, of one of the most illustrious families of Spain. He entered the army a mere youth, and gave such proofs of his courage and

capacity for command in the battle of Pavia (1525), in Hungary in battles against the Turks, in Charles V.'s expedition to Tunis and Algiers, and in Provence, that he rose quickly from rank to rank, becoming general at twenty-six, and commander-in-chief at thirty years of age. His skilful defence of Navarre and Catalonia gained him his rank as Duke of Alva. In 1547 he contributed greatly to the victory which Charles V. gained at Mühlberg over John Frederick, Elector of Saxony. Under his influence, as president of the council of war, the captive elector was condemned to death; and it was entirely against his wish that the emperor commuted the sentence. He took part under the emperor in the unsuccessful expedition against Henry II., king of France, who had taken possession of Metz; but was more fortunate in his next campaign (in 1555) in Italy, against the combined armies of the pope and the French king. After the abdication of Charles V. in 1556, Alva continued to hold the command of the army, and overran the States of the Church, but was obliged by the command of Philip II. to conclude a peace with Pope Paul IV., and restore all his conquests. Being recalled from Italy, he appeared in 1559 at the court of France, and as proxy for his sovereign espoused Elizabeth, Henry II.'s daughter.

When the inhabitants of the Netherlands, who had been accustomed to freedom, revolted against the tyranny of Spain, and especially against the hated Inquisition, the Duke of Alva's counsel was to suppress the insurrection with rigour. The king accordingly sent him to the Netherlands in 1567, with unlimited power and a large military force. His first step on arriving was to establish what was called the 'Bloody Council,' in which he himself at first presided, and over which he afterwards appointed the sanguinary Don Juan de Vargas. This tribunal condemned all without distinction whose opinions appeared dubious, or whose wealth excited jealousy. The present and the absent, the living and the dead, were subjected alike to trial, and their property confiscated by the council. As many as 100,000 abandoned their native country, many of them industrious artisans, mechanics, and merchants, who emigrated to England, while many others enlisted under the banners of the proscribed princes, Louis and William of Orange. Alva, rendered still more savage by a defeat which befell his lieutenant, the Duke of Aremberg, sent Counts Egmont and Horn to the block. He afterwards defeated Prince Louis, and compelled William of Orange to retire to Germany; upon which he entered Brussels in the greatest triumph on the 22d December 1568. The pope presented him with a consecrated hat and sword, as Defender of the Catholic faith; an honour which, having been hitherto conferred only on crowned heads, increased his insolence to the highest degree. His executioners shed more blood than his soldiers; and none now withstood his arms except Holland and Zealand. But these provinces continually renewed their efforts against him, and succeeded in destroying the fleet which had been equipped by his orders. Recalled by his own desire in 1573, he resigned the command of the troops to the mild Don Louis de Requesens, and left the country, in which, as he himself boasted, he had executed 18,000 men. The war which he had kindled burned for nearly seventy years, and cost Spain untold treasure, her finest troops, and the loss of seven of the richest provinces of the Netherlands.

Alva soon lost the royal favour for sheltering his son from the consequences of a misdemeanour, and retired to his castle, till, in 1580, he was recalled to a command in the war against Portugal, the crown of which Philip claimed as his hereditary right. He quickly drove out Don Antonio, who, as grandson of John III., had taken possession of the throne, and overran the whole country with his accustomed cruelty and rapacity; he seized the treasures of the capital himself, while he allowed the soldiers to plunder without mercy the suburbs and the surrounding country. Philip, dissatisfied with these proceedings, desired to have an investigation of the conduct of the duke; but the haughty bearing of the latter, and the fear of a revolt, induced him to abandon it. Shortly after, Alva died at Thomar, 12th January 1582, at the age of 74. He had a haughty carriage, a hard voice, and a dark and gloomy countenance. He was cruel, avaricious, and a fanatical bigot. It has been said of him, that during sixty years of military service he never lost a battle, and never allowed himself to be surprised. See Motley's *Dutch Republic* (1856).

Alvara'do, a town of Mexico, on the Gulf of Mexico, at the mouth of the river Alvarado, 40 miles SE. of Vera Cruz. Pop. 6000.

Alvarado, PEDRO DE, a famous comrade of Cortes, was born at Badajoz, towards the close of the 15th century. In 1518 he sailed for the New World, and accompanied Grijalva in his exploring voyage along the shores of the American continent. It was now that the Spaniards heard for the first time of the riches of Montezuma, and of his vast empire. Alvarado was soon sent back to Cuba to inform the governor Velasquez of the result of the expedition. In February 1519 he sailed with Cortes and his little band of heroes from Havana, and took an active part in all the incidents of the conquest of Mexico. He held the city of Mexico during the absence of his chief, and massacred in the midst of a fête a great number of disaffected Aztec nobles. In the famous night-retreat of 1st July 1520 (*la noche triste*), Alvarado commanded the rear-guard, and covered himself with glory by his reckless courage. After the conquest of Mexico he subdued, with a small force, the tribes on the coast of the Pacific in the direction of Guatemala. On his return to Spain, the Emperor Charles V. gave him a splendid reception, and appointed him governor of Guatemala. Numerous adventurers followed him to the New World, and Alvarado soon embarked on the Pacific a force of five hundred soldiers for the capture of Quito. He landed near Cape San Francisco, whence he penetrated into the heart of the country, crossing the Andes by a daring march. In the interior he was met by some of the troops of Pizarro, headed by Almagro; but, chivalrously disclaiming any intention to interfere with his countryman's rights, he agreed to retire, on receiving an indemnity for his arduous undertaking. On his next visit to Spain, he cleared himself from the misrepresentations of Pizarro with such success that he received the government of Honduras in addition to Guatemala. Again he embarked for the New World, and pursued his course of discovery and conquest; but, having landed on the Mexican coast to aid the Spaniards in punishing a revolt of the Chichimecas of New Galicia, met his death through accident in 1541.

Alvarez, DON JOSÉ, the greatest of modern Spanish sculptors, was born in 1768, in the province of Cordova. During youth he laboured with his father, a stone-mason; and when twenty years old, began to study drawing and sculpture in the academy at Granada. He secured the patronage of the Bishop of Cordova, and in 1794 was received into the academy of San Fernando, where in 1799 he gained the first prize and a grant to enable him to study at Paris and Rome. In Rome, where he lived on terms of friendship with Canova and Thorvaldsen, he executed a famous group, now in the Royal Museum of Madrid,

representing a scene in the defence of Saragossa. At Rome till 1826, he died at Madrid in 1827.

Alwar, or ULWAR, a Rajput state of India, with an area of 3200 sq. m., and a pop. of 800,000. The capital, Alwar, is a town of 40,000 inhabitants, 94 miles WNW. of Agra.

Alyscamps, or ALISCANS (equivalent to *Champs Élysées*), a suburb of Arles (q.v.).

Amadavat. See WEAVER-BIRD.

Amade'us (i.e. 'Love-God'), a common name in the House of Savoy. The first who bore it was Count Amadeus, who lived in the 11th century; but the first to make an important figure in history was AMADEUS V. (1249–1323).—AMADEUS VIII., born in 1383, secured the elevation of Savoy into a duchy (1416), and in 1418 Piedmont chose him for its ruler; but in 1434 he retired to a hermitage on the shores of the Lake of Geneva. He was elected pope in 1439, when he assumed the name of Felix V.; but he resigned the papal chair in 1449, and died two years afterwards at Geneva.—AMADEUS I. of Spain, born in 1845, the second son of King Victor-Emmanuel of Italy, was elected king of Spain in 1870, but, owing to the want of popular sympathy with his government, he abdicated the throne in February 1873, and, as Duke of Aosta, returned to Italy. Died 18th Jan. 1890.

Am'adis, a much-used name in the chivalric poetry of the middle ages. Of the many romances (see ROMANCE) that may be grouped under it, that which narrates the adventures of Amadis of Gaul is at once the most ancient and the best. It is believed that the earliest forms of the story were a lost Castilian version, perhaps about 1250, and a Portuguese version, also lost, composed about 1370 by Vasco de Lobeira of Porto. Most likely these earlier versions were in verse. Instead of these, we have a Spanish version of almost a hundred years later, written by Garci-Ordoñez de Montalvo about 1465, but first printed in 1508. This prose romance is one of the three spared by the licentiate and the barber at the burning of Don Quixote's books, and the barber's reason is that 'it is the best of all the books of this kind.' Its hero is Amadis, the model of every knightly virtue, son of King Perion of Gaul and Elisena, Princess of Brittany; he is sent away to Scotland, where he falls in love with Oriana, the incomparable daughter of King Lisuarte of England, and the narration of the course of this love story, with its varied adventures, wide journeys into foreign lands, numberless struggles with knights, giants, and robbers, forms the chief subject of the romance. The work is wearisome from its length, but it contains many pathetic and striking passages, and has great value as a mirror of the manners of the age of chivalry.

The Spanish Amadis romances consist of twelve books, of which the first four contain the history of Amadis of Gaul. The earliest existing version of this is, as has been said, that of Montalvo, and the earliest edition now in existence bears the date of 1508. He himself added a fifth book containing the adventures of Esplandian (1510), the eldest son of Amadis and Gloriana; later writers have multiplied the posterity of the old hero. Already in 1510 appeared a sixth book, with the history of Florisando, his nephew; in 1514, 1526, and 1535 respectively, a seventh, eighth, and ninth book, with the wonderful histories of Lisuarte of Greece, a son of Esplandian, and Perion of Gaul, and the still more wonderful history of Amadis of Greece, a great-grandson of the Gallic hero. Then follow Don Florisel of Niquea and Anaxartes, son of Lisuarte, whose history, with that of the children of the latter, fills the tenth and eleventh books. Lastly, the twelfth book, printed in 1546, narrates the exploits of Don Silves de la Selva, son of Amadis of Greece and Finistea. A French translation appeared in 1540, an Italian in 1546, an English in 1588, while a version in German was published in 1583. The French translators increased this series of romances from twelve to twenty-four books; the German, to thirty. Lastly, a Frenchman, Gilbert Saunier Duverdier, at the beginning of the 17th century, arranged all these romances into a harmonious and consecutive series, and with his compilation in seven volumes, the *Roman des Romans*, brought the history of Amadis and the series of about fifty volumes to a close. A version of the old romance in French was published by Creuzé de Lesser in 1813; in English, by William Stewart Rose, in 1803; while the literary skill of Southey produced in 1803 an abridgment that is still readable. On the other hand, Wieland's *Neuer Amadis* has nothing in common with the more ancient Amadises, except the title. See Baret, *De l'Amadis de Gaule* (Par. 1873); and Braunfels, *Amadis von Gallien* (Leip. 1876).

Am'adou (Fr.) is obtained from two species of Hymenomycete Fungi, *Polyporus igniarius* (hard amadou, or touchwood) and *P. fomentarius* (soft amadou, or German tinder). They grow upon old trees in Britain, and on the continent of Europe. They are used as styptics for stanching slight wounds; and when steel and flint were in general use for striking fire, were much employed as tinder, being prepared for this purpose by boiling in a solution of nitre. Attempts have also been made at their cultivation. The soft amadou is used for making small surgical pads, for which its elasticity peculiarly fits it. It is also employed by the Laplanders and others for Moxa (q.v.). It is sometimes made into razor-strops, and this use is likewise made of *P. betulinus.*—*P. officinalis*, the *Agaricon* of Dioscorides, which grows upon larch-trees in the south of Europe, is a drastic purgative, now rarely employed. *P. suaveolens*, which grows upon the stems of willows, and is easily recognised by its anise-like smell, was formerly employed in medicine, in cases of consumption, under the name of *Fungus salicis.* All these species are very similar in appearance. Another species of the same genus, *P. destructor*, is one of the fungi known by the name of Dry Rot (q.v.).—The remarkably light wood of *Hernandia guianensis*, a shrub of the natural order Thymelæaceæ, is readily kindled by flint and steel, and is used in Guiana as amadou.

Amal'ekites, a warlike, nomadic tribe in the SW. of Palestine and the peninsula of Sinai. From the very first, they manifested an uncompromising hostility to the Israelites, whose rear-guard they attacked after the passage through the Red Sea. In consequence of this, they received no mercy at the hands of the Israelites, when the latter had established themselves in Palestine. Saul nearly annihilated them. Twenty years later, David, while dwelling amongst the Philistines, penetrated into their land, and defeated them with dreadful slaughter. Another rising was mercilessly crushed by David, and the descendants of the survivors were finally extirpated in the days of Hezekiah, king of Judah, by the Simeonites.

Amalfi, a seaport on the Gulf of Salerno, on the W. coast of Southern Italy, is nearly encircled by mountains, and lies at the mouth of a deep ravine, 24 miles SE. of Naples. It is the seat of an ancient archbishopric, and, besides the ancient Romanesque cathedral, possesses several fine churches and a former Capuchin convent. The population is about 7000, who are chiefly engaged in the coasting trade, fisheries, and the manufacture of paper, soap, and macaroni. The history of Amalfi in the middle ages is both

important and interesting. It is said to have been founded under Constantine the Great, and was long a powerful and independent republic, having at one time a population of 50,000, besides a dependent territory ten times as large; it was governed by its own 'doges,' and was the centre of eastern trade; but about the close of the 11th century, fell under the power of the Normans. It was plundered by the Pisans in 1135, and its commercial decay was completed by a terrible storm in 1343, which destroyed its quays. The maritime laws of Amalfi (*Tabula Amalphitana*) once prevailed throughout Italy, and formed an important contribution to the *Consolato del Mare*. The unique manuscript of the Pandects (q.v.) was discovered at Amalfi; and Flavio Gioja, inventor of the compass, and Masaniello, were born there. Masaniello's house was destroyed by the great landslip of March 1924.

Amalgam, an alloy in which one of the metals is mercury. On the nature of the union, it has been observed that 'on adding successive small quantities of silver to mercury, a great variety of fluid amalgams are apparently produced; but in reality, the chief, if not the sole compound, is a solid amalgam, which is merely diffused throughout the fluid mass.' The fluidity of an amalgam would thus seem to depend on there being an excess of mercury above what is necessary to form a definite compound. Mercury unites readily with gold and silver at the usual temperature. It has no disposition to unite with iron even when hot. A solid amalgam of tin is used to silver looking-glasses.

Amalgamation is employed on a small scale in some processes of gilding, the silver or other metal being overlaid with a film of gold amalgam, and the mercury being then driven off by heat. But its most extensive use is in separating gold, and especially silver, from certain of their ores. The mercury dissolves the particles of the metal, and leaves the earthy particles; it is then easily separated from the gold or silver. This process, discovered in Mexico in 1557 by Bartolomé de Medina, is still used in Mexico, and was introduced with great success into the Californian and Australian gold-fields. The mode of application is to crush the quartz rock which serves as the matrix in which the small particles of gold are imbedded; place the fragments in a barrel or revolving drum with mercury, and agitate for some time. The mercury attaches all the gold particles to itself; and in the apparatus, when fully agitated, there is found a semi-fluid mass, which is the mercury, appearing half-congealed, and containing all the gold. It is only necessary to place this amalgam in a retort and apply heat, when the mercury sublimes over—and can be re-employed for further amalgamation—and leaves the gold in the body of the retort.

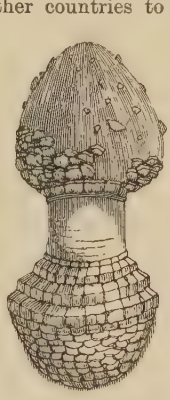
Several amalgams may be regarded as definite chemical compounds. Thus, when gold-leaf is placed in mercury, and the amalgam so produced filtered by being squeezed in a chamois-leather bag, the uncombined mercury oozes through the skin, but a definite amalgam of 2 of gold and 1 of mercury remains behind in the leather filter. Tin amalgam is employed in silvering looking-glasses, and is formed by laying a sheet of tinfoil on a table, covering it with mercury, and then placing, by a sliding movement, the sheet of glass over it. This amalgam contains 3 of mercury and 1 of tin; glass balls are silvered with an amalgam of 10 mercury, 1 tin, 1 lead, and 2 bismuth, best prepared by melting together the last three metals, and then adding the mercury.

A silver amalgam, containing about 26 per cent. of metallic silver—and, from the clusters of crystals somewhat resembling a tree, called *Arbor Dianæ*, or Tree of Diana—is prepared by placing about half a teaspoonful of mercury in a small phial, and filling the bottle with a solution of nitrate of silver of the strength of 25 grains to the ounce. In the course of a few days the arborescent appearance presents itself. The amalgam used for frictional electric machines is made from 1 tin, 1 zinc, and 3 mercury, to which sand is afterwards added.

Amalia, Anna, Duchess of Saxe-Weimar, was born in 1739, and, left a widow in the second year of her marriage (1758), by her judicious rule as guardian of her infant son, she enabled the country to recover from the effects of the Seven Years' War. She appointed Wieland tutor to her son, afterwards Grand-duke, and attracted to Weimar such men as Herder, Goethe, Musæus, Schiller; forming a galaxy of genius such as few courts were ever graced with. The battle of Jena is said to have broken her heart; she died (1807) six months after that event.

Amande de Terre. See Cyperus.

Amani'ta, a genus of Hymenomycete Fungi, nearly allied to the mushrooms (*Agaricus*). Several of the species are edible, notably the delicious Orange (*A. cæsarea*), but the majority are poisonous. *A. muscaria*, which is pretty common in woods, especially of fir and beech, in Britain, is one of the most dangerous fungi. It is sometimes called Fly Agaric, being used in Sweden and other countries to kill flies and bugs, for which



Amanita muscaria, young.

Amanita muscaria, full-grown, more reduced.

purpose it is steeped in milk. The pileus or cap is of an orange-red colour, with white warts, the gills white, and the stem bulbous. It grows to a considerable size. It contains a bitter and narcotic principle, resembling in its physiological action that of Indian hemp (*hashish*), and is used by the Kamchadales to produce intoxication. The intoxicating principle passes off in the urine of those who swallow it, a circumstance of which they or others often avail themselves, when abundance of the fungus is not at hand.

Am'aranth (*Amaranthus*), the leading genus of Amaranthaceæ, an order differing from Chenopodiaceæ (q.v.), in the possession of a crowded bracteate inflorescence and membranous perianth. *A. caudatus* (Love-lies-bleeding), *A. speciosus*, *A. hypochondriacus* (Prince's Feather), and other species, are common annuals in our flower-gardens. *A. tricolor*, from China, is cultivated in the Southern United States, and is popularly known as Joseph's Coat. The spikes of *A. caudatus* are sometimes several feet in length. The dry red bracts which surround the flower retain their freshness for a long time after being gathered; for which reason the plant has been employed from early times as

an emblem of immortality.—The Globe Amaranth (*Gomphrena globosa*) and the Cockscomb (q.v.), well-known tender annuals, belong to the same natural order. The Globe Amaranth is much cultivated in Portugal and other Roman Catholic countries for adorning churches in winter. Its flowers, which are of a shining purple, retain their beauty and freshness for several years. No species of the order can be regarded as a true native of Britain, although *A. blitum* is now found in waste places near London and elsewhere. *A. blitum*, *A. oleraceus*, and other species, are used as pot-herbs, but rarely in Britain. Wholesome mucilaginous qualities are very generally found in the leaves throughout the order. The seeds of *A. frumentaceus* (called Kiery) and of *A. anardhana* are gathered as corn-crops in India. —Medicinal properties are ascribed to some species of the order, particularly to *Gomphrena officinalis* and *macrocephala*, which have a high and probably exaggerated reputation in Brazil, as the popular names, '*para todo*,' &c., indicate, as cures for many diseases.

Love-lies-bleeding (*Amaranthus caudatus*).

Amarapu'ra ('city of the immortals') was founded in 1783 by Bodawpaya in place of Sagaing, on the other side of the river Irawadi. There Bodawpaya received the first British Embassy under Captain Symes. It was temporarily deserted in favour of Ava in 1822, and finally abandoned in 1857, when Mandalay became the capital of Burma. Little remains of the old city but some rows of beautiful trees and a few ruined pagodas.

Amara-Sinha, a celebrated Hindu grammarian, of whose life little is known; his date is by various authorities put at 56 B.C., the 5th century A.D., and the 11th century. He was a Buddhist; and it is believed that most of his writings perished during the persecution by the orthodox Brahmins in the 4th and 5th centuries. His *Amara-Kosha* ('Thesaurus of Amara'), a Sanskrit vocabulary, containing about 10,000 words, has been largely used by almost all the grammarians of India.

Amaravati. See AMRAVATI.

Ama'ri, MICHELE, an Italian historian and orientalist, was born at Palermo, July 7, 1806. Hardly had he commenced his studies when his father's sentence to thirty years' imprisonment for a political offence plunged him into straitened circumstances. His love for an English lady saved him from despair, and secured him a knowledge of the English tongue. He devoted himself to Sicilian history, and in 1841 published his famous investigation into the history of the Sicilian Vespers, a masterpiece of historical criticism, which reversed the common notion that the massacre was the result of a deep conspiracy on the part of the nobles; showing that it was rather a national outbreak, occasioned by the tyranny of the foreign rulers, that really brought about the deliverance of Sicily. The book was quickly prohibited, and, as a consequence, widely read. Its publisher was imprisoned, but its author fled to France. The revolution of 1848 recalled him to Sicily, where he was elected vice-president of the committee of war, and next sent by the provisional government on a diplomatic mission to France and England. The restoration in 1849 sent him once more into exile, from which he was recalled in 1859 to fill the chair of Arabic, first at Pisa, afterwards at Florence. In 1860 he took an active part in Garibaldi's expedition to Sicily. After the accession of Sicily to the kingdom of Italy, he was made a senator, and in 1862–4 held the portfolio of Public Instruction, afterwards returning to his chair. He presided over an orientalists' congress in 1878, and died at Florence, 16th July 1889. Important works are his *Storia dei Musulmanni di Sicilia* (1853–73); *Bibliotheca Arabo-siculo* (1857); *Nuovi Ricordi Arabici sulla Storia di Genova* (1873); and *Le Epigrafi Arabiche di Sicilia* (1875).

Amaryllid'eæ, or AMARYLLIDACEÆ, a natural order of petaloid Monocotyledons, essentially distinguished from Liliaceæ by their inferior ovary, and including many species distinguished by the beauty of their flowers. They are herbaceous plants, or when, as in the genera Agave and Fourcroya, they form woody stems, they have still the character of gigantic herbs rather than of shrubs. The greater part are bulbous-rooted. There are about 400 known species, natives of tropical or sub-tropical, and more sparingly of temperate regions, but particularly abundant at the Cape of Good Hope. A few species only are European. Many of them are much-prized ornaments of our gardens and hothouses. Amongst these are different species of Narcissus, Amaryllis, Alstrœmeria, Pancratium, &c. (q.v.). To this order belong the Snowdrop and Snowflake, and it includes also the American Aloe (*Agave*). *Sternbergia lutea* is said to be the lily of the field referred to in the Sermon on the Mount. The properties of the Amaryllideæ are rarely very distinct; the Agave (q.v.), however, yields its juice, the bulbs of snowdrop and daffodil are emetic, and the juice of *Hæmanthus toxicarius* is used by the Hottentots as an arrow-poison.

Amaryllis, a genus of bulbous-rooted herbs of the natural order Amaryllideæ (q.v.), contains a large number of species, natives of the warmer regions of the globe. Many of them have flowers of very great beauty, and are extensively cultivated by florists, who have also produced many varieties and hybrids.

Amasia, a town in the province of Sivas, in Asia Minor, in the deep valley of the Yeshil-Irmak. The ancient town, long capital of the kings of Pontus, was the birthplace of Strabo. There are numerous interesting remains of antiquity, particularly the tombs of the kings of Pontus. Much silk is produced in and around Amasia; also wine, cotton, corn, and madder. Silver, copper, and salt mines are wrought in the neighbourhood. Silk and salt are the chief articles of export. Pop. 35,000, of whom about one-third are Christians.

Ama'sis, a king of Egypt, of humble origin, who rose to be general, and when sent to put down an insurrection, joined the rebels, and was proclaimed king (570 B.C.). He cultivated the friendship of the Greeks, opened up to them the commerce of Egypt (previously confined to Naucratis), married a Greek wife, and took a bodyguard of Greeks into pay. Pythagoras and Solon are said to have visited him. For his alliance with Polycrates, see POLYCRATES. During his reign of 44 years, he greatly promoted the prosperity and adornment of Egypt.

Amateur (Fr.), one who does anything for *love*, as distinguished from one who makes it a profession. There is no general definition of an

amateur applying to all sports, and different associations are by no means in accord. Thus, by the Amateur Athletic Association an amateur is defined as 'one who has never competed for a money-prize or staked bet, or with or against a professional for any prize, or who has never taught, pursued, or assisted in the practice of athletic exercises as a means of obtaining a livelihood.' By the rules, again, of the Amateur Rowing Association, 'no person shall be considered an amateur oarsman, sculler, or coxswain, (1) who has ever taken part in any open competition for a stake, money, or entrance-fee; (2) who has ever knowingly competed with or against a professional for any prize; (3) who has ever taught, pursued, or assisted in the practice of athletic exercises of any kind for profit; (4) who has ever been employed in or about boats, or in manual labour for money or wages; (5) who is or has been by trade or employment for wages a mechanic, artisan, or labourer, or engaged in any menial duty.' The bicycling rules differ, and certain competitions are allowed between amateurs and professionals; while many so-called amateurs are men in the pay of manufacturers of bicycles, and ride in races for the purpose of advertising their employers' machines. In cricket it has been said that the difference between amateur and professional is, that the amateur receives two or three times as much money as the professional. In lawn-tennis and archery contests, money-prizes are openly played for, and nobody thinks of calling the players professionals. In golf, the line between amateur and professional has always been difficult to draw, on account of the number of boys employed to carry clubs, who afterwards develop into tradesmen. A general deliverance on the subject defines an amateur as one who does not play for, or accept, money prizes in a competition open to professionals.

Amati, a family of Cremona, famous violin-makers in the 16th and 17th centuries. Its most illustrious members were Andrea (*c.* 1520–*c.* 1580); his two sons, Antonio (1550–1638) and Geronimo (1551–1635); Nicolo (1596–1684), son of Geronimo, and master of Stradivari; Geronimo (1649–1740), son of Nicolo. See VIOLIN.

Amatitlán, a deep lake in the Central American state of Guatemala, surrounded with high and precipitous rocks of volcanic origin. It empties into the Pacific Ocean through the river Michatoyat. Near the banks of the lake are many hot springs, and on the river is the town of Amatitlán, in 1840 but a miserable Indian village, transformed by the introduction of cochineal (now abandoned) into an active town of 10,000 inhabitants.

Amaurosis (Gr. *amauros,* 'obscure') is the name applied to total blindness when no change can be seen in the eye sufficient to account for it. *Amblyopia* is used to denote partial loss of sight under similar circumstances. The meaning of these terms has become very much more limited since the invention of the Ophthalmoscope (q.v.), which has rendered visible, in the interior of the eye, the cause of loss of sight in many cases where it was previously unknown. They are still, however, unfortunately sometimes used to denote loss of sight from atrophy of the optic nerve (see the article EYE). Amaurosis—for which an old term was *Gutta serena*—and amblyopia may occur in the course of various diseases, especially disease of the brain, Bright's disease, diabetes, hysteria; may result from a blow on the eye; or may be present, usually only in one eye, from early life (congenital amblyopia). Amblyopia, much more rarely amaurosis, may be produced by large doses of quinine, or by the prolonged and excessive use of alcohol and other drugs, or by inhalation of certain fumes, but far most commonly by tobacco (toxic amblyopia). The treatment of these conditions is the removal of their cause, when ascertainable. In toxic amblyopia, abstinence from the drug which produced the disease usually results in cure, unless the case be of long standing and great severity.

Amazon, or AMAZONS (Portuguese *Amazõnas;* from an Indian word meaning 'boat destroyer,' referring to the tidal wave at its mouth), is the largest river of South America and of the globe, and is also known locally as Marañón, Orellana, Solimoens, Parana-tinga, and Parana-uassu. According to geographical usage, the name Marañón belongs properly to the more northerly of its two main head-streams, rising in Lake Lauricocha (Peru) about 10° 30′ S. lat., 76° 10′ W. long. Most geographers consider this stream (frequently called the Tunguragua) as the true Amazon; but some late writers insist that the river Apurimac, or Ucayali (the more southern of the two great head-streams), is the true Amazon. The Ucayali is some 320 miles longer than the Tunguragua. It is commonly said that the river Amazon, to its remotest source, is nearly 4000 miles long; but by the best estimates it would appear that at the outside its length does not much exceed 3400 miles. The Upper Marañón is the only stream that breaks through the central Cordillera of Peru; but five other streams, all tributaries of the Ucayali, cut through the magnificent eastern chain of the Andes, as also does the Marañón itself. Most of the upper branches flow in deep mountain gorges, which, though much elevated, have a hot climate. East of the Cordillera the vast forest-plain is entered, which stretches from the sub-Andean foothills to the sea. It is a region rich in botanical treasures, having a fertile soil and a prodigiously large rainfall. Owing to this rainfall, the country is traversed by a very great number of large navigable rivers, either direct or indirect affluents of the Amazon, and many of them scarcely known even by name to the geographer. Steam navigation has been introduced on many of the larger branches; but the natural resources of the country are very little developed.

The principal tributaries from the north are the Napo, the Putumayo, the Japurá, and the Rio Negro; from the south the Ucayali, the Javary, the Jutahy, the Juruá, the Purús (with its great affluent the Aguiry), the Madeira (itself the recipient of mighty rivers, such as the Beni and the Mamoré), the Tapajos, the Xingu, and the Tocantins, which receives the waters of the Araguay. For a considerable distance the main river runs through Peruvian territory, but its course lies chiefly through the northern half of Brazil, its general direction being to the NNE. Its mouth is crossed by the equator. The drainage area of the river is placed at 2,500,000 sq. m., or two-thirds the area of Europe; the network of the rivers constituting the Amazonian system (the largest river system in the world) is estimated to have a total length of some 150,000 miles, of which some 30,000 miles are open to steam navigation. Many of the narrow side-channels, so characteristic of the Amazonian forest-plains, are navigable also, either by steamboat or by smaller craft, such as the canoes in which the india-rubber and other products of the forest are collected. There is some dispute as to whether the islands at the mouth of the river are really deltaic; but it is certain that further inland a great part of the country is insular and river-built, and consequently of a true delta formation. In the rainy season, much of this region is subject to overflow. The main channel, at the mouth, is 50 miles wide, exclusive of the Pará mouth and the island of Joannes. The

average flow of the river is placed at 2¼ miles per hour. The tides are noticed for about 400 miles up the river. The tidal phenomenon called the *bore* (here known as *Pororoca*) is very destructive in the main channel of the lower river, near its mouth; and from this phenomenon the Indian name of the river (Amassona, 'boat-destroyer') is said to be derived. Older writers derived the name from the female warriors supposed to have been seen by early explorers in the valley of this river. The name Marañón is derived from a voyager who visited the river in 1503; Orellana was the name of one who sailed on it in 1540.

The outflowing current of the Amazon in times of flood is sometimes perceived at a distance of 200 miles from the land. The climate of the river-valley, though hot and very damp, is greatly mitigated by its trade-winds, which blow from the east with little interruption throughout the dry season. These winds at some periods of the year become very stormy and even dangerous to unskilled boatmen. The river abounds in fish in very great variety of species, some of them of great value as food-fishes; and turtles and alligators are plentiful, as well as porpoises and manatees. The main river is fullest from March to June inclusive, and lowest in August and September. The surrounding country is very thinly peopled, and many of the native tribes are savages of wild and degraded character. The river is open to the commerce of all nations, but trade has been impeded by import and export duties. Mention should be made of the river Cassiquiare, a stream ordinarily navigable, which flows from the Orinoco 180 miles to the Rio Negro, the largest northern tributary of the Amazon. Pará is the principal outlet by sea of the commerce of the Amazon Valley. This valley has been the field of many unsuccessful attempts at colonisation. The immense extent of its forests (almost everywhere nearly impenetrable by land on account of the enormous growth of lianas, or woody vines of countless species) has greatly hindered the progress of agriculture. Many useful and some highly valuable timber-trees grow on the river, notably the balata tree (which yields a substance for insulating electric wires and for machinery) and the turpentine tree (which yields amazon oil, a kind of turpentine). Mahogany and other timbers are floated down the river from the interior. The botany of the country is not very well known, many of the trees having flowers only on the upper branches, the lower portions being cut off from the influence of the light by the dense foliage. Paradoxically, this forest, the largest and densest in the world, imports from North America much of its building timber, and some of the steamers on the river have found it cheaper to consume English coal than to burn the wood that grows on every side.

The shipment to Pará of india-rubber and Brazil-nuts, largely collected by the Indians and the scattered colonists, is important. But even this employment is seldom remunerative. The rubber here found is of excellent quality and high price; but the times, places, and other conditions of gathering cargoes are extremely uncertain, and the river and the forests afford to the natives all things which are required to satisfy their simple and inartificial needs. Valuable products are quinine-yielding barks, coca, cacao, sugar, coffee, palm-wax, ipecacuanha, copaiba, sarsaparilla, vanilla, also kapok, babassu and other oil-seeds. There is some gold. The western part of the Amazon Valley is, of course, more elevated than the rest of the great forest; and between its tributary streams there are occasionally found lofty mountain-spurs, which are connected with the grand range of the Eastern Andes. The scenery is finer and the productions are more varied than in the lower valley; but the climate is not any healthier.

See A. R. Wallace, *Travels on the Amazon and Rio Negro* (1853); H. W. Bates, *The Naturalist on the Amazon* (1864); Richard Spruce, *Notes of a Botantist on the Amazon and Andes* (ed. Wallace, 1908); books by H. H. Smith (1880), Mozans (1910), Algot Lange (1912 and 1914), Fountain (1914), le Cointe (in Fr. 2 vols. 1922); H. H. Smith, *Rubber Industry of the Amazon* (1916).

Amazo'nas, (1) the northernmost state of Brazil, has an area of 704,835 sq. m., and a population of 360,000. Its surface is covered with virgin forests. The capital is Manáos.—(2) A department of Peru, bounded on the N. by Ecuador, with an area of 14,000 sq. m. Pop. 70,600.

Am'azons, in Greek Mythology, a nation of women who suffered no men to remain among them, but marched to battle under the command of their queen. They held occasional intercourse with the men of the neighbouring states. If boys were born to them, they either sent them to their fathers or killed them. But they brought up the girls for war, and burned off their right breasts, that they might not be impeded in bending the bow. From this custom they received the name of Amazons—that is, 'breastless.' Such is the ordinary tale; and it is idle to look for any historical evidence to prove the actual existence of such a nation. Ebers insisted that Greek imagination made the institution of armed priestesses, as found amongst various races, into nations of women warriors; and some recent archæologists derive the tradition from the armed priestesses or women warriors depicted on Hittite sculptures. From the Circassian word 'Maza,' signifying the moon, some referred the myth of the Amazons to the worship of the moon. Three nations of Amazons have been mentioned by the ancients: (1) The Asiatic Amazons, from whom the others branched off. These dwelt on the shores of the Black Sea, and among the mountains of the Caucasus, especially in the neighbourhood of the modern Trebizond. They are said to have at one time subdued the whole of Asia, and to have built Smyrna, Ephesus, Cumæ, and other cities. Their queen, Hippolyte, or, according to others, Antiope, was killed by Hercules, in fulfilling the ninth of the labours imposed on him by Eurystheus, which consisted in taking from her the shoulder-belt bestowed on her by Ares. On one of their expeditions, the Amazons came to Attica, in the time of Theseus. They also marched under the command of their queen, Penthesilea, to assist Priam against the Greeks. They even appear upon the scene in the time of Alexander the Great, when their queen, Thalestris, paid him a visit, in order to become a mother by the conqueror of Asia.—(2) The Scythian Amazons, who in after-times married among the neighbouring Scythians, and withdrew farther into Sarmatia.—(3) The African Amazons, who, under the command of their queen, Myrina, subdued the Gorgons, marched through Egypt and Arabia, and founded their capital on the Lake Tritonis, but were then annihilated by Hercules. The myth of the Amazons was a fertile subject in ancient Greek art, and their historical existence and locality are gravely discussed by rationalising historians and geographers like Arrian and Strabo. Even later than the middle ages they were believed to exist in Africa and America, and the name of the river Amazon was associated with this belief.—In early Christian Ireland, down till the end of the 7th century, the women fought regularly in the tribal armies along with the men. Modern Amazons constituted part of the army of Dahomey till the French conquest in 1892; they were subjected to severe and systematic

discipline, and were formidable and by no means merely ornamental soldiers.

Ambala. See UMBALLA.

Ambassador. Diplomatic envoys are of four kinds: (1) Ambassadors accredited directly to a foreign sovereign, and personally representing the sovereign who appoints them. (2) Ministers accredited to a foreign sovereign or state, who do not represent the sovereign, but only the state which sends them, and its affairs. These are usually called envoys extraordinary and ministers plenipotentiary. (3) Ministers resident, called simply envoys. These differ not in representative power, but in dignity. (4) Chargés d'Affaires accredited to foreign ministers. The term ambassador is commonly used to denote any kind of diplomatic minister. Besides representing his sovereign, the ambassador keeps him well informed as to what goes on in the country where he resides; defends the interests of his fellow-countrymen abroad; and promotes goodwill between his own country and that in which he dwells. He carries with him credentials, and instructions for his own guidance. The ambassador of the first rank is entitled to public and private audiences with the sovereign to whom he is sent; a minister of the second class, to private audiences only. In the performance of all his diplomatic duties, an ambassador is understood to represent, not only the affairs, but the dignity and the power of his master; and by the law of nations he has many important rights and privileges, the chief of which is exemption from the control of the municipal laws of the nation wherein he is to exercise his functions, an exemption that is not confined to the ambassador himself, but is extended to all his suite, including not only the persons employed by him in diplomatic services, but his wife, chaplain, and household generally. But there is a dispute among legal writers whether this exemption extends to *all crimes*, or whether it is limited to such offences as are *mala prohibita*, as coining, and not to those that are *mala in se*, as murder. But as the security of an ambassador in conducting the intercourse of nations is of more importance than the punishment of a particular crime, there are few modern examples of an ambassador being punished for any offence. The full exemption of an ambassador from legal process in civil cases was first recognised by 7 Anne, chap. 12, a statute passed to appease the wrath of Peter the Great of Russia on learning that his ambassador had been actually arrested, and taken out of his coach in London, for a debt of £50. It was, however, merely a declaratory act, confirming the common law and law of nations.

But although an ambassador is not amenable to any tribunal of the country he resides in, he cannot misconduct himself with impunity. He must respect the laws and customs of the country in which he is officially resident; and if he violates or offends these laws and customs, he may be complained of to the court or government which he represents; or if the offence is of a very serious nature, his recall may be demanded, or the sovereign to whom he has given such offence may dismiss him peremptorily, and further require that he be brought to trial in his own country. It hardly need be added, that if an ambassador is guilty of an offence which threatens the safety of the state, he ceases to enjoy the privileges of the exemption in question.

There are some other and inferior privileges which are very generally allowed to ambassadors: they are, for instance, permitted the free exercise of their religion; they are, in general, exempted from direct taxation, they have special letter-bags, and they are usually allowed to import their goods without paying any custom-house duties—a privilege, however, which, being liable to abuse, has been limited. It is usual to ascertain whether an appointment will be acceptable, since a sovereign can refuse to receive an ambassador.

Ambassadors of the first class ordinarily reside regularly at the court to which they are accredited. But sometimes ambassadors are sent on special occasions, as for the negotiation of treaties, when they receive additional powers, and have the higher rank of Ambassadors Extraordinary. The employment of permanent ambassadors originated in the 15th century. The British diplomatic corps included till lately nine ambassadors, in the restricted sense, accredited to Vienna, Paris, St Petersburg, Constantinople, Berlin, Rome, Washington, Madrid, and Tokyo. The envoys to Portugal, Brazil, and Belgium have now the higher rank. Till 1893 the United States sent to Europe only envoys extraordinary and ministers plenipotentiary, who ranked in the second class of diplomatic agents. Ambassadors were thereafter accredited to London, Paris, and Berlin.

The 'rupture of diplomatic relations' by the withdrawal, or still more sharply, by the dismissal of an ambassador, is tantamount to a declaration of war, and now often takes the place of any more formal manifesto or proclamation—which indeed is designed rather for the information of neutrals (see NEUTRALITY). Some authorities on international law deny that any declaration is imperative. After the diplomatic rupture, the interests of the enemy's subjects in the country of either belligerent are entrusted by arrangement to one or other of the ambassadors of neutral powers. The usual title for ambassadors proper is 'excellency,' which is often conferred also on the lower ranks of ministers. See ENVOY, CHARGÉ D'AFFAIRES, CONSUL, and INTERNATIONAL LAW.

Amber, a decayed city of Jeypore (q.v.).

Amber (through Spanish from Arabic *anbar*, 'ambergris,' from its supposed resemblance), a substance analogous to the vegetable resins, and in all probability derived from various extinct coniferous trees of the Tertiary period, although now appearing, like coal, as a product of the mineral kingdom. It is usually of a pale-yellow transparent colour, sometimes reddish or brownish, and almost opaque, and it is occasionally greenish, bluish, or violet coloured. It occurs in irregular lumps, grains, or drops; has a perfectly conchoidal fracture, is slightly brittle, emits an agreeable odour when rubbed, melts at about 536° F. (280° C.), and burns with a bright flame and pleasant smell. It becomes negatively electric by friction, and possesses this property in a high degree—which, indeed, was first observed in it, and the term electricity is derived from *ēlektron*, the Greek name of amber. The specific gravity of amber is 1·065 to 1·070. Deprived, by means of ether, of all its soluble constituents, its composition is similar to that of camphor, $C_{10}H_{16}O$. An acid called succinic acid (named from the Lat. *succinum*, 'amber') is obtained from it. It was highly prized by the ancients for personal and household ornaments. There is mention of it in Homer; and in lake dwellings and ancient graves in various parts of Europe amber ornaments have been found. It was regarded as a charm against disease and witchcraft. Necklaces of amber beads, under the name of lammer beads (Fr. *l'ambre*), were formerly much worn by the peasantry, especially the fisher-folk, in Scotland, partly on account of their supposed virtues. Large quantities are still consumed in Mohammedan worship at Mecca, and it is in great demand throughout the East. It was obtained by the ancients from the coasts of the

Baltic Sea, where it is still found, especially between Königsberg and Memel, in greater abundance than anywhere else in the world. It is there partly cast up by the sea, especially after storms, partly obtained by means of nets, and partly by systematic dredging; and is also got by digging in the 'blue earth' and other superficial strata near the coast, in which it is most plentifully found. Amber is found occasionally in diluvial deposits, as in the gravel near London, and sparingly along the east coast of England; but it is very rare in Britain. It is obtained in small quantities from the coasts of Sicily and the Adriatic, and is found in different parts of Europe, in Siberia, Greenland, Kamchatka, Australia, United States, Burma, &c. It sometimes encloses crustacea, centipedes, and insects of species which no longer exist. Leaves have also been found inclosed in it. Specimens which contain insects or leaves being much valued, fictitious ones are often manufactured and imposed upon collectors. According to an ancient fable, amber is the tears of the sisters of Phaëthon, who, after his death, were changed into poplars. In Berlin is a piece weighing fifteen pounds, said to be the largest ever found, and valued at £1500; but it is extremely rare that pieces of ten pounds' weight are met with.

Amber had formerly a high reputation as a medicine, but the virtues ascribed to it were almost entirely imaginary. A volatile oil is obtained from it by distillation, which has the reputation of being an antispasmodic of special value in infantile convulsions. Amber is employed in the arts; for the manufacture of smokers' mouthpieces, for jewelry, and many ornamental objects. It is wrought by carving, rasping, filing, and polishing, or is turned on a lathe. Artificial amber is frequently used instead of the genuine article, which it closely resembles. It is composed of copal, camphor, and turpentine, and may be distinguished from amber by its lower melting-point, and by its readily softening in cold ether, which leaves real amber unaffected. It has been supposed that the famous Cremona violins owe their fine tone and preservation, in part at least, to the use of an amber varnish; and in the present day the production of such a varnish has occupied much attention. Amber contains two resins which in their natural condition are not soluble in spirit or turpentine. When fused, however, it is possible to incorporate boiled linseed oil and subsequently turpentine, but in this process great difficulty is experienced in avoiding overheating, resulting as it does in a dark-coloured and less limpid product. A very clear pale varnish is best obtained by heating six parts of amber, two of boiled linseed oil, and eighteen of turpentine to 752° F. (400° C.), in a strong copper vessel. See Buffum, *The Tears of the Heliades* (1896), and German works by Klebs, Waldmann, and Tesdorpf. —'The Amber Witch,' described by Meinhold, is also the subject of an opera by W. V. Wallace.

Amberg, a town of Bavaria, once the capital of the Upper Palatinate, 35 miles E. of Nuremberg. Chief buildings are the town-hall (1490) and the church of St Martin (1421), with a steeple 321 feet high. The principal products are earthenware, ironmongery, wood and leather goods, while there is a brisk trade in live-stock, corn, and hops. Many of the inhabitants are employed as miners in the neighbouring mountains. In the neighbourhood is the Maria-Hilfsberg, a place of pilgrimage. Pop. (1925) 26,330.

Ambergris (i.e. 'gray amber'), a fatty substance, of an ash-gray colour, with yellow or reddish striæ, like those of marble, which is found in lumps of from half an ounce in weight to 100 lb. and upwards, floating on the sea, or cast upon the seashore in different parts of the world, and is also taken by whale-fishers from the bowels of the spermaceti whale (*Physeter macrocephalus*). Much ambergris is obtained from the coasts of the Bahama Islands; it is also brought from different parts of the East Indies, and the coasts of Africa, Brazil, China, and Japan. It is probable that all of it is produced by the spermaceti whale, and that it is a morbid secretion in the intestinal canal of that animal, derived from the bile. It is highly valued on account of its agreeable smell, and is much used in perfumery. The finer kinds are exceedingly high in price. It has been strongly recommended for medicinal uses, but is scarcely employed in Europe; although in some parts of Asia and Africa it is much used as a medicine, and also as a condiment. Its specific gravity ranges from ·780 to ·926. It almost always contains black spots, which appear to be caused by the presence of beaks of the *Sepia octopodia*, the principal food of the spermaceti whale. It consists in great part (85 per cent.) of a peculiar brilliant white crystalline substance called *Ambreïn*, believed to be identical with cholesterol.

Amberite (so called from its appearance), a smokeless powder made from Gun-cotton (q.v.), barium nitrate, solid paraffin, and other substances.

Ambidexterity. See RIGHT-HANDEDNESS.

Ambleside, an urban district of Westmorland, about a mile from the head of Lake Windermere, is a tourist centre for the Lake District. Rydal Mount, long Wordsworth's home; Nab Cottage, where Hartley Coleridge lodged; Fox How, a summer retreat of Dr Arnold; and The Knoll, where Miss Martineau lived and died, are near. In the Borrans Field is a Roman camp. Pop. 3000.

Amblyopia (Gr. *amblys*, 'dim,' *ōps*, 'eye'). See AMAUROSIS.

Amblyopsis, a North American bony fish, found in the Mammoth Cave of Kentucky, and interesting as illustrating in the rudimentary condition of its eyes the effects of darkness and consequent disuse. It only measures a few inches in length, is colourless, and has its small eyes covered by the skin. It seems able, however, to hear acutely, and the wrinkles of skin on its head are regarded as special feeling organs. *Typhlichthys* is a closely allied genus found in the same surroundings, while another relative, *Chologaster*, occurring in the ditches of the South Carolina rice-fields, is, as one would expect, open-eyed. The caves are tenanted by similar half-blind animals of various classes (see PROTEUS, and CAVE-ANIMALS). Truly blind fishes are only found in the unsunned ocean depths.

Amblys'toma, a genus of tailed amphibians in the gill-less or Salamandroid sub-order. It is the adult form of Axolotl (q.v.), from which it differs in its mode of respiration, and in a few external characters.

Ambo (Gr. *ambōn*), a kind of reading-desk or pulpit, which in early churches was placed in the choir. The epistle and gospel were read from the ambo, and sermons were sometimes preached from it. The ambo had two ascents—one from the east, and the other from the west. In many of the Roman churches there were two ambones, one on each side of the choir, from one of which the gospel was read, and from the other the epistle. They were first introduced about the 4th century, but were superseded by pulpits in the 14th century.

Amboise, a French town in the department of Indre-et-Loire, on the Loire, 15 miles by rail E. of Tours. It lies in a region so rich in vineyards that

it has been called 'the Garden of France.' The town is memorable for the Huguenot conspiracy (1560), which cost the lives of 1200 Protestants, and as the place whence was issued the Edict of Amboise (1563), conceding certain privileges to the Huguenots. Leonardo da Vinci died at Amboise in 1519. The castle, finely situated on a rocky plateau overlooking the Loire, from 1434 was a frequent residence of the Valois kings; the birth and death place of Charles VIII.; and since the days of Louis XI., 15,000 prisoners are said to have been confined in its subterranean 'oubliettes.' The fine carving of the Chapelle St Hubert and of the Logis du Roi (both dating from the end of the 15th century) is worthy of mention. Pop. 4500.

Amboise, GEORGE OF, cardinal and prime minister under Louis XII. of France, was born in 1460 near Amboise. In his 14th year he was made Bishop of Montauban, and in 1493 Archbishop of Rouen. By his zealous services he soon secured the confidence of Louis of Orleans, who, on his accession to the throne as Louis XII. in 1498, made him his chief-minister. Thenceforward Amboise, who in the same year received a cardinal's hat, became the prime mover in all the affairs of the realm, including that spirited Italian policy which influenced so much the fortunes of France. After the death of Pope Alexander VI. (1503), Amboise endeavoured to raise himself to the papal see, and having failed, became the dangerous enemy of the succeeding popes, Pius III. and Julius II. To secure his own election, Amboise encouraged a schism between the French Church and the see of Rome, and convened a separate council, first at Pisa, afterwards at Milan and Lyons; but his plans were frustrated by the failures of the French arms in Italy. He died at Lyons, 25th May 1510. It was said that his fortune of 11,000,000 livres had been accumulated not over-scrupulously.

Amboyna, the most important of the Moluccas or Spice Islands belonging to the Dutch, lies SW. of Ceram, and NW. of Banda. Area, 385 sq. m. Pop. about 58,000, nearly a third Mohammedans. A bay runs into the island lengthways, forming two peninsulas, the northern called Hitu, and the southern, Leitimor. Amboyna is mountainous, well-watered, fertile, and healthy. Clove, sago, mango, and coconut trees are abundant, also fine timber for cabinet-work. The Dutch have diligently fostered the growth of the clove, and forced its culture by tyrannical methods. The Dutch took Amboyna from the Portuguese in 1605. The British settlement was destroyed by the Dutch in the infamous Amboyna massacre of 1623, for which, in 1654, Cromwell exacted compensation. The British held the island, 1796–1802. It became finally Dutch in 1814.

AMBOYNA, capital of the Dutch Moluccas, is situated on the NW. shore of Leitimor, on the bay of Amboyna, and has a good roadstead. The government buildings are in Fort Victoria. Pop. about 11,000.

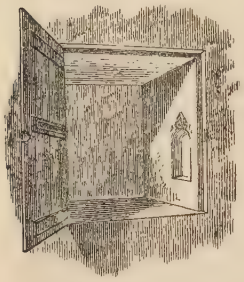
Ambracia, a town in ancient Epirus, on the river Arachthus, north of the Ambracian Gulf. Colonised by the Corinthians about 630 B.C., it soon attained to great wealth and importance. Pyrrhus, king of Epirus, made it his residence. On its site stands the modern town of Arta (q.v.).

Ambriz, a seaport in the north of the Portuguese territory of Angola, West Africa, exporting copper, rubber, coffee, and gums. The town of Ambriz was annexed in 1855, and was formerly the port of a small negro kingdom. See ANGOLA.

Ambrose, ST, one of the most celebrated of the ancient fathers of the church, was born about the year 340, probably at Treves, where his father, as Prefect of Gaul, was wont to reside. Ambrose received a fortunate omen even in his cradle: a swarm of bees covered the slumbering boy; and the astonished nurse saw that the bees clustered round his mouth, without doing him any harm. His father, perhaps remembering a similar wonder related of Plato, foreboded from this a high destiny for Ambrose. He received an excellent education, and went with his brother Satyrus to Milan, in order to follow the legal profession. He soon distinguished himself so much, that in 369 he was appointed, by Valentinian, Prefect of Upper Italy and Milan. In this office, his gentleness and wisdom won for him the esteem and love of the people, whose prosperity had been much injured by the troubles caused by Arianism. Accordingly, by Arians and Catholics alike, he was unanimously called to be Bishop of Milan in 374. He long refused to accept this dignity, and even left the city; yet he soon returned, was baptised, as hitherto he had been only a catechumen, and was consecrated eight days afterwards. The anniversary of this event (December 7) is still celebrated as a festival by the Catholic Church. Having sold his goods, and distributed the proceeds among the poor, Ambrose proceeded to fit himself for his new office by a course of theological study, under Simplician, a presbyter of Rome. As a bishop, he won the universal reverence of all, by his mild and gentle character; but he was severe and stern against wickedness of every kind, even in high places. Thus, he repulsed the Emperor Theodosius himself even from the door of the church, on account of his having caused the rebellious Thessalonians to be cruelly massacred by Rufinus, excommunicated him, and only restored him to the church after eight months of severe penance. Only his unflinching defiance of the court party enabled him to save the churches in his diocese from the Arian heretics; and his almost threatening earnestness probably contributed largely to the defeat of Symmachus, a wealthy prefect of Rome, who had petitioned for the restoration of the pagan worship, after the famine of 383. Ambrose's most valuable legacy to the church is his hymns, and the improvements he introduced into the service. The Ambrosian ritual, a use or liturgy still retained in the Milanese Church, is claimed for him, and he is the author of many hymns which he introduced into the Western Church. The hymn, *Te Deum Laudamus*, has been erroneously ascribed to him. For the *Ambrosian Chant*, see CHANT. Ambrose died in 397. His works, generally ascetic in tone, in which he followed in many things the Greek theological writers, were published by the Benedictines (2 vols. Paris, 1686–90), and by Ballerini (Milan, 1878). There is a selection by de Romestin in the Nicene Library (New York, 1896). See the Life by the Duc de Broglie (1899). Ambrose is the patron saint of Milan.—The AMBROSIAN LIBRARY there, named in his honour, was established in 1609 by Cardinal Borromeo.

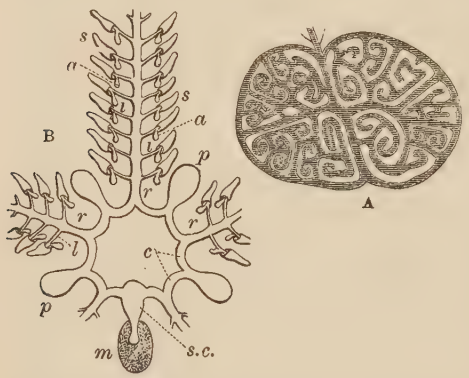
Ambrosia (formed from Gr. *ambrŏtos*, 'immortal'), in Greek Mythology, the food of the gods, as nectar was their drink. It gave to those who ate of it immortal youth and beauty. It was brought by doves to Zeus, and was occasionally bestowed upon such human beings as were the peculiar favourites of the gods. Ambrosia was also used as a fragrant salve, which the goddesses employed to heighten their beauty; with which Zeus himself anointed his locks; and which had the property of preserving bodies from corruption. The term was applied by Pliny, and by our early herbalists, to various plants. Hindu mythology has also its *amrita*, the beverage of the gods; and the Scandinavian gods were preserved in perpetual vigour by eating the apples guarded by Idun.

Ambry, a niche or recess in the wall of a church, shut in by a door, for the purpose of holding the vestments and utensils, such as the chalices, basins, cruets, &c. used for the service of the Mass. In monastic buildings, ambries were used for various purposes, such as keeping plate, hanging towels for the monks to dry their hands with before dinner, and the like. In this sense, the term ambry seems to have been applied to any kind of cupboard which was closed in and locked, and it is so used in Scotland at the present day.



Ambry, Rushden, Northamptonshire—14th century.

Ambulacral System (Lat. *ambulare*, 'to walk'), a term applied to a partly locomotor, partly respiratory, system in the Starfish group of animals. The term water-vascular is on the whole preferable. The system usually consists (1) of five radial canals, giving off tube-feet, which are



A, cross section of complex supply-canal of a starfish—the so-called stone-canal (after Gegenbaur). B, diagrammatic plan of system in a starfish (after Gegenbaur): *r*, radial canals, giving off branches, *l*, to suctorial tube-feet, *s*, with lateral and internal reservoirs or ampullæ, *a*; *c*, circular canal, with side reservoirs or Polian vesicles, *p*, with supply or stone canal, *s.c.*, and special entrance or madreporic plate, *m*.

generally suctorial; (2) of a circular canal surrounding the mouth, and uniting the oral ends of the five radials; and (3) of a special supply-canal, by which water enters the system. For further description and figures, see the articles ECHINODERMATA, HOLOTHURIANS, SEA-URCHINS, and STARFISHES.

Ambulance (Fr.), originally a *walking* or movable hospital, but since the Crimean war a wagon for the conveyance of sick and wounded. The term *Field-ambulance* designates a complete unit of succour for sick and wounded soldiers. Three of these units, each commanded by a lieutenant-colonel of the Royal Army Medical Corps, form part of the British infantry division (see DIVISION). Each field-ambulance, accommodating 150 patients, is divided into three sections, each commanded by an officer of the Medical Corps. Each section has a Bearer Sub-division, consisting of 6 stretcher squads of 6 bearers each, with a few orderlies, and a Tent Sub-division of about 70 rank and file, which includes Army Service Corps drivers, &c., and the total personnel amounts to 241 officers and men, with 51 horses. There are 10 ambulance wagons, 7 being motors and 3 horsed, 3 water-carts, 11 carts and wagons for medical stores and baggage. The ambulance wagon can carry 4 cases lying down, 2 lying and 4 sitting, or 12 sitting up.

A British cavalry division has 4 cavalry field-ambulances, on the same pattern as the above, but of only half the size. During an action the Battalion (q.v.) stretcher-bearers (4 per company, or 16 in all) pick up the wounded as they fall and carry them to the regimental dressing-station, if one has been formed, where they are attended to by the medical officer of the unit, or to the tent sub-division of the field-ambulance. The stretcher-bearers of the field-ambulance assist in this work. After the action, the ambulance wagons drive on to the field.

It is very important that the field-ambulances should be emptied of patients as expeditiously as possible, if there is probability of further fighting. This is done to a clearing hospital, an establishment adapted for 200 sick, using the field-ambulance's own vehicles, and country carts, and empty supply and ammunition wagons that are returning to the advanced base for fresh supplies. If a railway then becomes available, there is an equipment of ambulance trains, each capable of carrying 100 patients lying down. If a suitable water-way is available, there will be ambulance boats and barges. If the country is roadless, a corps of coolies carry on stretchers, or mules are equipped with cacolets, which are seats swung on each side of the animals. Female nurses are not employed in connection with ambulances or clearing hospitals, but only in stationary and general hospitals, and to a small extent on ambulance trains.

Ambulance wagons did not exist in the British army during the Crimea. The sick and wounded were carried by the sailors in hammocks, in ordinary transport wagons, and in ambulances borrowed from the French; nor were there any trained stretcher-bearers, field-hospitals, or hospital ships; the bandsmen alone were available to carry away their wounded comrades, and the regimental surgeons dressed their wounds on the field. To meet this deficiency, Lord Herbert's commission was appointed in 1857 and 1858, and effected considerable improvements, amongst others introducing into the service an ambulance wagon of similar type to that used by the French in the Crimea. Though restricted in military language to the wagon above described, the expressions *ambulance* (as of St John's or Red Cross societies) and *ambulance corps* are popularly used to cover the whole modern organisation for the immediate relief of wounded soldiers on the field of battle, called officially a *Bearer Sub-division* (q.v.) in the British army, and a Sanitary Detachment in the German.

A *civil* ambulance association was originated in 1877 by the Knights of St John, with the object of giving practical instruction respecting first aid to sufferers from accidents. Its success has led to the establishment of a St Andrew's Ambulance Association in Scotland, and of local centres throughout the kingdom. Classes are trained by its lecturers, and in most large towns ambulance wagons and attendants can be summoned by telephone from the society's office. Most members of the British police force now hold either the certificate or the higher medal of the association.

Ambuscade, a manœuvre in warfare, whose general nature is indicated by the original Italian *imboscata* ('concealed in a wood'), but which now applies to any attempt to attack an enemy by lying in wait and coming upon him unexpectedly. The tactics of modern times render ambuscades unusual in civilised warfare. It is something more sudden and unexpected than a 'surprise.'

See Colonel Malleson's *Ambushes and Surprises* (1883).

Ameer, Amir, other forms of Emir (q.v.).

Amelanchier (so called from the Savoy name of the medlar) is a small but widely dispersed genus of small trees belonging to the Rosaceæ, and planted in this country on account of their pretty foliage and racemes of white flowers, which appear early in spring. They are very hardy. *Amelanchier botryapium,* an American species, is sometimes called June-berry, from its early ripening; and *A. ovalis* produces a pleasant fruit, which makes excellent puddings.

Amen. See AMMON.

Amen, a Hebrew word of asseveration, equivalent to 'Yea,' 'Truly,' which has been commonly adopted in the forms of Christian worship. In Jewish synagogues, the Amen is pronounced by the congregation at the conclusion of the benediction given at parting. Among the early Christians, the prayer offered by the presbyter was concluded by the word Amen, uttered by the congregation (cf. 1 Cor. xiv. 16). Justin Martyr is the earliest of the fathers who alludes to the use of the response. In speaking of the sacrament of the Supper, he says that, at the close of the benediction and prayer, all the assembly respond 'Amen.' According to Tertullian, none but the faithful were permitted to join in the response. Up to the 6th century, it was the custom for those present at the Lord's Supper to utter a loud 'Amen' at the reception of the bread and wine, and to join in *shouting* 'Amen' at the close of the consecration. The same custom was observed at baptism, where the sponsors and witnesses responded vehemently. In the Greek Church, this word was pronounced after the name of each person of the Trinity; and at the close of the baptismal formula, the people responded. At the conclusion of prayer, it signifies (according to the English Church Catechism) *So be it;* after the repetition of the Creed, *So is it.* The Roman Catholic version of the New Testament (Reims, 1582) substitutes Amen for the 'verily' of our Authorised Version, it being the word used in the original Greek. The Mohammedans also use this word in their service.

Amende-honorable (Fr., 'honourable compensation') was in France in the 9th century a public and humiliating confession made by traitors and other offenders in court, after being stripped of their shirts by the executioner, and having had other indignities inflicted on them. In England, the phrase is used figuratively of a full and frank apology sufficient to atone for the wounded honour of another.

Amendment, in judicial proceedings, means the correction of any errors or the supplying of any omissions in the record of a civil action or in a criminal indictment. In criminal proceedings greater strictness is observed, but in civil actions almost any amendment will now be allowed by the courts which does not embarrass or surprise the opponent. In civil proceedings leave of court is usually necessary; but under modern statutes there are large powers of amendment of claim or counter-claim without leave. In Scotland, in proceedings in the Court of Session, it is competent, under an Act of Sederunt passed in 1907, to make amendments extending the declaratory or pecuniary conclusions of the summons, or altering the instance of the action, subject to conditions as to expenses.

In the United States, amendments were authorised to be made by courts of general jurisdiction at common law. The equitable power of amendment of pleadings and proceedings in the courts, and in all the various steps in a cause, has been conferred on the United States courts by acts of congress. The changes and additions made to the constitution of the United States during the last hundred years are called the amendments. The senate may amend money bills passed by the House of Representatives, but cannot originate such bills.

In British parliamentary procedure, the object of an amendment is generally to effect such an alteration in a question or motion as will make certain members vote in favour of it who, without such alteration, must either have voted against it, or have abstained from voting. This is quite distinct from the false amendment, which, like the 'previous question,' is intended to evade an expression of opinion on the main question, and which is effected by moving the omission of all the words in the question after the word 'that' at the beginning, and the substitution of other words of a different import. Proper amendments are obviously of great convenience to a deliberative assembly, because otherwise they would be compelled to express a positive or negative opinion upon the whole question as put. The amendment may even contain an alternative proposition wholly opposed to the original question. An amendment is generally put to the House in the form, 'That the words proposed to be left out stand part of the question;' the insertion or addition of new words being subsequently voted on. No amendment can be made in the earlier part of a question, after the later part has been considered. Words which have been voted to stand part of the question cannot afterwards be amended. An amendment of an amendment may be proposed, where the original amendment is simply to leave out words; and the original amendment becomes for the time the question. The 'previous question,' which, in effect, is designed to prevent the main question being put, can only be moved when the main question is before the meeting, and therefore not during the discussion of an amendment; but when the question of amendment has been determined, the previous question may then be moved. An amendment does not require notice, although notice is usually given. It must, however, be reasonably relevant to the original question, and should not render the original question, as altered, unintelligible. The amendments moved to public and private bills at their various stages are all technical in form, and all that need be said is that, according to practice, amendments are not moved to the motion for the first reading of a bill. The rules adopted in parliament as to amendments to questions should, as far as possible, be followed by the chairmen of public meetings. In particular, it is desirable to dispose of one amendment before another is proposed.

Amenophis, AMUNOPH, or AMEN-HOTEP is the name borne by four Egyptian kings of the 18th dynasty, which began with Amasis or Aahmes I., about 1700 B.C. See EGYPT, AKHNATON.

Amentaceæ, a vast order of very varying limits, consisting of trees and shrubs, whose flowers are unisexual, the male flowers, and very often also the female flowers, disposed in *amenta* or Catkins (q.v.), and the perianth either wanting or incomplete. The Amentaceæ include the Cupuliferæ (see ALDER, BIRCH, HAZEL, HORNBEAM, BEECH, OAK, CHESTNUT) and the Juglandaceæ (see WALNUT, HICKORY). In the most comprehensive sense, the Amentaceæ are also frequently reckoned to include the Myricaceæ (see BOG MYRTLE), the Casuarinaceæ (see CASUARINA), the Salicaceæ (see WILLOW), and even the Piperaceæ (see PEPPER).

Amenthes, the unseen world of the ancient Egyptians, the Hades of the Greeks, who borrowed their ideas about the lower world from Egypt. The

passage across the river, the islands of the blessed, Cerberus, and the judgment of the dead, all have their original in Amenthes, the localities of which, and the account of its divinities, are described in the famous Book of the Dead (q.v.), as well as in pictorial representations. The principal scene is the judgment seat of Osiris, the judge of the dead, before whom the dead are carried by the goddess Ma ('righteousness'), while Horus and Anubis weigh out their deeds. See EGYPT.

America has since the beginning of the 16th century (see *History*, below) been the general name for the western continent and its adjacent islands, forming the main body of land found in the western hemisphere. America has an area of over 16,500,000 sq. m., and is larger than Europe and Africa together. It is about four times as large as Europe, five times as large as Australia, and half as large again as Africa; but is considerably smaller in area than Asia. It is customary to regard Greenland as a part of America; while the adjacent island of Iceland, partly in the western hemisphere, is usually associated with Europe. The other principal American islands in the Atlantic are Newfoundland, Cape Breton, Anticosti, Prince Edward Island, Long Island, the Bermudas, the Antilles or West Indies, Joannes, the Falkland Islands, Staten Land, and South Georgia. At the southern extremity of America lies the archipelago of Fuegia (Tierra del Fuego). In the Pacific are the Aleutian Islands, Kadiak, the Alexander and Queen Charlotte groups, Vancouver and other British-Columbian Islands; the Santa Barbara group, Revilla-Gigedo, the Pearl Islands, and others in the Gulf of Panamá, the Galápagos, Juan Fernández and the associated islets, Chiloé and the Chonos Archipelago. In the Arctic Ocean there are many large but unimportant islands.

The American continent consists of two principal parts, NORTH AMERICA and SOUTH AMERICA, which are connected by the narrow Isthmus of Panamá. These two bodies of land, though differing very much in climate and productions, are much alike in several respects. Each is of triangular outline, with the shortest side to the north, and with a narrow southern prolongation. In outline, North and South America have each a certain resemblance to Africa. The two Americas have each a high range of volcanic mountains, extending from north to south along the west coast, a broad central plain, and a relatively low eastern mountain-range. Their great rivers have also some features in common, especially in regard to their direction. Thus the La Plata recalls the Mississippi, the Amazon the St Lawrence; and the position and course of the Magdalena suggest comparison with the river Mackenzie. But there are some manifest points of contrast. North America has several large peninsulas, such as Labrador, Nova Scotia, Florida, Yucatán, Old California, Aliaska, and others; while South America has no true peninsulas worth naming. North America sends to the Pacific four great rivers, the Yukon, the Fraser, the Columbia, and the Colorado; while South America pours but little water into the Pacific. Besides the three great South American rivers already named, there are the Orinoco, the São Francisco, the Rio Negro, and a few other considerable streams that flow directly to the ocean; while in North America we find the Saskatchewan, Nelson, Penobscot, Hudson, Delaware, Susquehanna, Potomac, James, Cape Fear, Savannah, Mobile, Brazos, and several other important non-tributary rivers. There are also two great North American inland seas—Hudson Bay and the Gulf of Mexico; but nothing of the kind is seen in South America.

America is called the New World; and from the historical point of view, this name is obviously appropriate; but geologically it may be called the Old World, since the oldest known strata have their widest development on its surface.

NORTH AMERICA has (with water surface, and including the West Indies) an area of some 9,400,000 sq. m. It is larger than South America, which is in turn larger than Europe and Australia combined. Of the two great meridional lines of uplift, the western (that of the Rocky Mountains and their subsidiary chains) is vastly the greater, not only in height, but in breadth and length. From Alaska, in the NW., it extends throughout the Pacific coast-region. Near the two extremities volcanic activity is still great; but it is at present much more noteworthy in Central America than in Alaska. North of Mexico there is very little evidence of much very recent volcanic activity till we reach the Aliaska peninsula and the Aleutian Islands. Through those islands the volcanic chain makes a direct connection with the volcano-systems of Kamchatka, the Kuriles, Japan, Formosa, the Philippines, and the Malay Archipelago. Except those of the West Indies, all the active American volcanoes are found near the Pacific. There have, however, been severe earthquakes in the eastern section of the continent.

The western mountain-system of North America comprises a very great number of minor ranges, mostly having a north and south direction. The main chain (Sierra Madre) cannot be said to preserve an unmistakable identity throughout. The Coast Range, the Sierra Nevada, and the Cascade Mountains are the most noted of the western parallel ranges; they all lie on the Pacific slope, and they contain some of the highest of North American peaks. The elevated plateau called the Great Basin (chiefly in Utah and Nevada, U.S.), contains the Great Salt Lake and several smaller bodies of strongly saline water, evidently the remains of a much larger lake which once sent its waters to the sea; although at present the waters of the basin are all evaporated, its streams and lakes having no connection with the ocean.

The eastern or great Appalachian mountain-system has a general NNE. direction, nearly parallel with the Atlantic coast-line. Like the Brazilian mountains of South America, it is geologically much older than the corresponding western range; it is also far less elevated. The Appalachian Mountains begin at the south in the broken tablelands of Alabama. Through the Alleghanies, the Cumberlands, the Blue Ridge, and other parallel and variously named local ranges, they connect directly with the Catskills, the Shawangunk Mountains, the Helderberg Hills, and the Highlands of New York. Thence they continue NE. through the Green Mountains of Vermont to the Notre Dame Mountains and the Shickshock range of Eastern Canada. The mountains of Newfoundland, and the Watchish ridge of Labrador belong to the Appalachian system.

North of the St Lawrence River, the vast and complicated mountain-system of the Laurentides extends from the Atlantic to near Lake Superior, with a continuation into the Labrador peninsula. The Adirondacks are an outlying portion of the Laurentide system.

The highest mountain in North America is Mount McKinley (20,464 feet) in southern Alaska. The St Elias group on the Alaska-Yukon boundary extending into British Columbia includes Mount Logan (19,850), Mount St Elias (18,008), Mount Lucania (17,147), Mount King (17,130), Mount Foraker (17,100), Mount Steele (16,644), Mount Blackburn (16,140), and Mount Fairweather (15,400), as well as other lofty peaks. Of the

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Rocky Mountains in British Columbia, the highest is Mount Robson (12,972). Mount George Dawson (13,260) is on the coast. The highest peak of the Cascade Range is Mount Rainier (14,526), and of the Sierra Nevada is Mount Whitney (14,886), which is also the highest point in the United States proper. In Colorado there are several mountains over 14,000 feet, the principal being Blanca Peak (14,464), Mount Harvard (14,388), Mount Elbert (14,351), Mount Gray (14,341), La Plata Mountain (14,311), Massive Mountain (14,298), and Mount Lincoln (14,296). The highest point of the Alleghany system (Mount Mitchell) is only 6711 feet. Mount Washington in New Hampshire reaches 6291 feet, and Mount Mercy in the Adirondacks 5379 feet. The Mexican peaks, Gitlaltepetl or Orizaba (18,200), Popocatepetl (17,887), Ixtaccihuatl (17,000), and Nevado de Toluca (15,000) are all volcanic, though not all are still active, while in Central America there are several active volcanoes, several of them of fairly recent origin.

A remarkable feature of North America is the great central plain which reaches from the Arctic Ocean to the Gulf of Mexico. Its northern section is drained by the Mackenzie River; the central districts belong in part to the Saskatchewan-Nelson basin (whose outflow is to Hudson Bay), and in part to the St Lawrence system; while the southern half is mainly drained by the Mississippi. The only important break in the continuity of this great plain occurs in the Ozark Mountain region of Missouri and Arkansas. These mountains are low and irregularly disposed; they are connected by a low ridge with the Rocky Mountain system. A prominent feature of the central plain is the *Hauteur des Terres*, a high ridge, whence flow the Mississippi, the Red River, the St Lawrence, and the Winnipeg. This ridge is nowhere over 2000 feet high, and its ascent is extremely gradual. To the NE., however, there is a marked, though not very apparent slope towards the tidal waters of Hudson Bay. The general elevation of the central plain of North America is not very great. It is remarkable that to the eastward for a great part of its extent it is not bounded by any mountain wall, the western ridges of the Appalachian system sloping very gently to the westward, although their eastern faces are often steep and abrupt. The western half of the great valley is much higher than the eastern; and most of the foot-hill region east of the Rocky Mountains, like the valleys which intervene between the many mountain-ridges, has an elevation of from 5000 to 6000 feet. The Anahuac plateau ranges from 6000 up to 8000 feet.

The most general name for the great plains of North America is *prairie;* but in its present American use, the term has lost something of its original meaning in the French language, and acquired some new modifications. For the most part, the word designates a treeless plain; but there are local distinctions between *timbered* and *bald* or treeless prairies; and many plains at one time bare of trees have become well timbered through the operations of natural or other causes. There is little doubt that the former prevalence of great annual prairie fires was a principal cause of the absence of trees on the great plains. The settlement and cultivation of the country has greatly checked the spread of prairie fires; and, as a consequence, the timbered belts, which were formerly limited to the banks of streams, have in many places so spread as to cover a large proportion of the surface. The planting of forest trees, stimulated by bounties and by other favouring legislation, has been extensively undertaken, and in many places has succeeded beyond expectation. There is still a difference of opinion as to whether tree-planting will ever increase the now insufficient rainfall of the high plains which border the Rocky Mountain region on the east. The prairies of North America vary much in respect of geological age, though very little of their area rests upon azoic strata Few prairies are of a dead-level surface, and many are 'rolling'—that is, their surface is a succession of low wave-like swells and depressions. Often there are shallow ravines or *coulées*, which, like the wady-valleys of Arabia, may represent the courses of ancient streams. The plains often rise over the level of their rivers by a succession of 'benches,' or terraces, which in North-western Canada are miscalled *steppes*. Geographers have extended the North Asiatic term *tundra* to the marshy and sphagnous plains of sub-arctic America. In the extreme south, many of the grassy plains are locally termed *savannahs;* and along the Lower Mississippi and its delta are found the singular *prairies tremblantes*, or quaking plains, which shake beneath the tread. Many of these *prairies tremblantes* afford pasturage for herds, and some are crossed by lines of railway. It is believed that in such cases the lower strata are highly charged with water, while the surface is rendered firm by a network of roots, which in some cases is buoyed up by collections of marsh gas. In general, the true prairies have a very strong and tough sod; but after thorough ploughing, the surface becomes friable, and the soil generally proves highly productive. There are, however, prairies with a light and sandy soil, and with small agricultural capabilities. In other places, sand-hills and hard flinty ridges occur. Towards the Rocky Mountains, irrigation is generally necessary, and the grazing of cattle and sheep replaces, to a great extent, the operations of agriculture.

The coast-line of North America on the west is almost everywhere high and rocky. To the south of Puget Sound, good harbours are rare; but British Columbia and Alaska have great numbers of good seaports, the coast-line being, in many places, deeply cut with high-walled fjords, or 'canals,' and elsewhere sheltered by ranges of high and well-wooded islands. The Atlantic coast, to the north of New York Bay, is generally rocky and well sheltered with islands, and has abundance of good natural harbours; but south of the parallel of New York, the coast of the mainland is almost everywhere low and sandy. Many of the best ports are formed by river-mouths, and have sand-bars across their entrances. Nowhere else in the world is there any such extent of low and sandy coast as on the Atlantic and Gulf seaboards of the United States.

Hydrography.—The fluviatile hydrography of North America is very remarkable. In general, Canada and the Atlantic slope are well-watered and have abundant rains. Along a narrow strip on the Pacific slope, from San Francisco southward to Acapulco, the water-supply is deficient, and the interior regions near the coast have locally a desert character; while from Acapulco southward the rainfall is ample for all needs. As will be seen further on, there is a marked analogy in this regard between the Pacific coast-region of North America and that of South America. The central valley is generally well supplied with water; but to the west of the Mississippi there are but scanty summer rains. As the Rocky Mountains are approached, the water-supply becomes more deficient; and, except where irrigation is practicable, agriculture proper generally gives place to the grazing of cattle. But in the Canadian part of the central valley there is ordinarily no deficiency of rainfall. In the Rocky Mountain region, the summers are generally very dry; and in some sections, irriga-

tion is required in order to produce crops. Still the great volume and length of the North American rivers, and the immense number of lakes, are sufficient proof of the amplitude of the general rainfall. In Canada, the lakes and rivers are especially numerous. It is stated that the St Lawrence, with its tributary lakes and rivers, contains one-half the fresh water of the globe. In the Rocky Mountain region of Canada, the great rivers, Yukon, Fraser, Columbia, Saskatchewan, and Mackenzie take their rise. Between these mountains and Hudson Bay, a girdle of vast lakes, or inland seas (Great Bear, Great Slave, Athabasca, Deer Lake, Winnipeg, and others), are seen to form a regular succession running from the Arctic Circle in a SSE. course to Lake Superior (350 by 100 miles), which is itself the largest fresh-water lake in the world, and the first of a wonderful chain of great sea-like expansions of the Upper St Lawrence. The line of these great lakes (from Great Bear Lake to the Lake of the Woods inclusive) marks the eastern limit of a fertile prairie region resting on fossiliferous rocks. East of this line we find a vast wilderness of 'Barren Grounds' and swamps, mostly unfertile, and geologically composed of azoic rocks. North of the St Lawrence system, almost the whole country is thickly studded with lakes, which, with their connecting streams, form a network of important water-ways traversable by canoes and boats. They nearly all swarm with valuable food-fishes, and many of the streams are capable of affording immense water-power. The river Saguenay is noted for the awful grandeur of its scenery. The Ottawa is the largest tributary of the St Lawrence, which is itself the largest in volume of North American rivers. Among the other large tributaries are the St Maurice, the Richelieu, the St Francis, and the Chaudière.

The Atlantic slope of the United States is well supplied with water, and many of its streams afford extensive navigation. The river Hudson, noted for its fine scenery, is remarkable as a deep tidal channel, affording the only naturally navigable water-way through the Appalachians. The Potomac is a river of notable character; and other important streams flowing to the Atlantic are the St John, the Penobscot, the Kennebec, the Merrimac (noted as affording more utilised water-power than any other river in the world), the Connecticut, the Delaware, the Susquehanna, the James, the Chowan, the Tar, the Neuse, the Cape Fear, the Great Pedee, the Santee, the Savannah, the Altamaha, and the St John's, nearly all navigable in their lower courses. The chief rivers flowing to the Gulf of Mexico are the Appalachicola, the Mobile, the Pearl, the great Mississippi, the Sabine, the Trinity, the Brazos, the Colorado of Texas, and the Rio Grande. The last-named river forms a part of the boundary between Mexico and the United States, and is the only very considerable stream of which any part is in Mexico, excepting the Colorado of the West (of which the mouth and lowest section are in Mexico), and the Santiago on the western slope. The United States portion of the great central plain is principally drained by the Gulf Coast rivers, and chiefly by the Mississippi (q.v.) and its great affluents. But a considerable part of this region has its outflow into the St Lawrence, through the great lakes; and in the north another area sends its waters to Hudson Bay, through the Nelson River. Along the crest or divide between these river-systems in Dakota and Minnesota, many lakes are found, some of them with no outlet. Of these last lakes, some are saline or brackish. Devil's Lake is the largest of these salt lakes.

Of the many large Alaskan rivers, the principal is the Yukon, which pours a vast flood into Behring (properly Bering) Sea. This is a channel of some steam-communication in summer. The Kuskoquim is another large stream of Alaska. The Fraser is a swift and strong river, flowing in a region of high mountains. The great river Columbia is noted alike for its navigation, its salmon-fisheries, and its enormous cataracts. The Rio Colorado, whose waters flow to the Gulf of California, traverses a desert plateau. Here, nearly every water-course runs in a deep-walled cañon—a narrow valley with precipitous sides, often of prodigious height. Many of the cañons are dry the greater part of the year. When rains occur, they wash the detritus of the rocky surface into the streams; and the swift waters, heavily laden with sharp sedimentary matter, act like a chisel in cutting away the bottoms of their own beds. In this way the cañons have been formed. The very aridity of the country has thus helped the process of cañon-formation, and of the consequent over-drainage of surface-strata. In a part of the Grand Cañon, the Colorado flows at a depth of 7000 feet below the general level of the country.

Climate.—The winter cold and the summer heat of North America seem, as a rule, to be extreme, when we consider the latitudes. Variations of temperature are more sudden and more extreme than in South America or Western Europe.

The arctic portion of North America has a climate of extreme severity; and much of the northern sub-arctic region has a decidedly arctic climate. Thus the Labrador peninsula is in the main a most forbidding and desolate expanse, covered with rocks and precipices, and having a winter far more rigorous and inhospitable than that of Lapland, or even Siberia. In the west, however, the corresponding region is nearly as mild as that of sub-arctic Europe; and Southern Alaska, at the coast-line, has very warm though rainy winters. Crossing the Rocky Mountains of Canada, we find the western half of the great central plain has not only a fertile soil, but a climate such that wheat can be grown even in the region of the Peace River; and it is asserted that the Mackenzie River valley is in part well adapted to cultivation, almost as far north as the Arctic Ocean. Yet the Barren Grounds west of Hudson Bay are altogether unfit for agriculture, and the same thing is true of much of the swampy and wooded region north of the Athabasca. But with every allowance, it remains certain that a large part of Western Canada is well adapted to the growth of barley, oats, and spring wheat of the first quality. The winters of this region are severe, but quite endurable; and it is their length rather than their severity that makes them dreaded by settlers. In that part of Western Canada which is crossed by the Canadian Pacific Railway, and extends northward in the valleys of the Red, Saskatchewan, Athabaska, and Peace Rivers, agriculture has of late years greatly developed, wheat being the great staple, and a large number of farmers have been attracted to this region. As a result, Canada promises to become one of the leading wheat countries of the world.

The spring-wheat belt extends for several degrees south of the Canada-United States boundary; and it is succeeded by the winter-wheat belt. Here maize becomes the leading cereal, and continues so southward through Mexico and Central America. The other cereals grown in the United States are much the same as those ordinarily produced in Europe. The sugar-beet is increasing in cultivation, the sugar-cane being raised only in the most southern parts of the United States, and in lati-

tudes still farther south. Tobacco is an important crop not only in tropical America, but nearly as far north as Canada. Cotton reaches its northern limit in California, Missouri, and Virginia. True rice is grown in the more southern United States; and an interesting though uncultivated native cereal called 'wild rice' (*Zizania aquatica*) grows in various parts of North America, and in some places its seed is extensively collected by the Indians. Throughout the Atlantic and Gulf slopes of North America, the winter climate is much more severe than in corresponding European latitudes. It will be observed that nearly all the cultivated crop-products of North America (except maize, potatoes, and tobacco) are of Old-World origin. The same thing is true in a less degree of the cultivated fruits. The European apple thrives even better in North America than in Europe; so likewise do the peach, the pear, and other fruits. But the grapes generally cultivated in America are of native or hybrid origin; although the European grape does well in California and Mexico. The cranberries, strawberries, and some of the other cultivated small fruits of North America, are of native origin, as are some of the more hardy varieties of the plum. Sub-tropical fruits, such as the orange, fig, and lemon, do well in that limited part of non-tropical North America which lies south of the frost-line.

Geology.—The geology of North America is a subject of much interest. The Laurentides and Adirondacks are composed chiefly of azoic rocks of remote geologic epoch. In the New England States, granitic and gneissoid rocks are very common, and injected dykes of very ancient date are abundant. Where palæozoic rocks are found in this region, they are often highly metamorphic. In no part of the world are evidences of glacial action more extensive or more interesting than in the northern two-thirds of North America. Throughout the Appalachian region, Silurian, Devonian, and Carboniferous strata are found, ranging from Newfoundland SSW. to Alabama; and coal-bearing strata are largely developed from Pennsylvania southward. Limited areas of coal occur in Newfoundland, Nova Scotia, and Massachusetts. West of the Alleghanies, true coals occur in most of the United States east of the Mississippi. But the coals of North Carolina, and some in Virginia, are Triassic. Nearly all the coals of Mexico, of the Pacific States, of the Rocky Mountains, and of the North-western Canada region, so far as is now known, are of either Tertiary or Cretaceous age. Though classed as lignites, many of them are excellent steam-coals, and some of them coke well, and are very serviceable in smelting operations. Strata belonging to nearly every recognised geologic period are discoverable in North America.

It is believed that a considerable share of Eastern Canada, together with a great part of the New England states, occupies the site of two or more large islands which together formed the most extensive surface development now existing of the oldest sedimentary rocks. Similar islands probably existed at various points along the great western Cordillera, both in North and South America, as well as in the West Indies, Guiana, and Brazil; and the building of the continent was essentially a process of extension, through which the spaces intervening between the various island-groups were converted into land. Enormous growth of the land areas was made during the Silurian period, and still greater before the close of the Devonian and Lower Carboniferous times. There is no doubt that the coal measures of North America, richly as they are now stored, were once much richer than at present. Glaciers have ploughed into the great coal-beds, torrents and floods have stripped large areas of the underlying rocks of their coaly covering, and the heat and pressure of injected dykes have graphitised some beds and burned up others. The greater part of the present Appalachian system of ridges and folds did not exist except in embryo, until about the close of the Palæozoic era. The great central plain of North America must have been mainly occupied by shallow seas even as late as the Cretaceous period, the strata of which, extensively developed to the east of the Rocky Mountains, have yielded the remains of many gigantic saurians, as well as of those wonderful toothed birds (*Odontornithes*) which have attracted the notice of naturalists everywhere. The Cretaceous seas seem to have been in great part converted into a land-surface before the beginning of the Tertiary period. But after the Cretaceous epoch had closed there remained great lakes and marshes, in the beds of which are now found remains of many wonderful mammalian forms. From the Miocene downwards, edentate remains, often of large-sized animals, are abundantly found in North America, although at present there are only a few living species known. According to Professor O. C. Marsh, North America is the original abode of the edentates. Far less abundant, though still plentiful, are remains of rodents. Various species of elephants also existed. The entirely extinct amblypod mammals were apparently peculiar to North America. Tapiroid, camel-like, and other mammals in great variety have left their bones in the Tertiary strata of the continent. The American species of rhinoceros probably became extinct before the end of the Pliocene time. The equine remains include some which may be regarded as relics of true horses; and it is supposed that the introduction of horses from Europe to America was simply a restoration of the species to its original habitat.

The Rocky Mountain region, in its present shape, is of much later geologic age than the Appalachian country. Vast lava-fields occur, and there are numerous craters of volcanoes not long extinct. The most powerful of known geysers, or intermittent thermal springs, occur in North America, chiefly in the Upper Valley of the Yellowstone River. Iron is abundantly developed in the Laurentides and in the Appalachians, and ores of a great variety of grades occur in almost every part of North America. The Lake Superior region and the state of Missouri are especially rich in iron ores. Some of the Cuban ores are of especial excellence. The states of Pennsylvania, New York, Ohio, Tennessee, and Alabama are prominent as seats of the iron industry.

Gold has been largely obtained from Mexico and Central America, from the Pacific slope and the Rocky Mountain region, from the Black Hills of Dakota, and from many places about the Appalachian range, and from Alaska and the neighbouring Yukon region. Silver ores are richest in Colorado, Nevada, and Utah; but argentiferous galena is widespread, occurring from Newfoundland, Eastern Canada, and Maine, to Mexico and to Lake Superior. Lead is largely produced in the silver regions, as also in Missouri, Iowa, Illinois, and Wisconsin. Petroleum has a rich development in Western Pennsylvania, and the adjacent districts of other states; also in Texas, Oklahoma, and California. The celebrated wells of *natural gas*, chiefly in Pennsylvania and adjacent states, have afforded valuable fuel to iron-works and other industrial establishments. The asphalts of Cuba are reported to be rich, but they are surpassed in value and availability by those of the island of Trinidad and the adjoining region of Venezuela. Salt is found extensively in Ontario, Michigan, New York, Louisiana, and the Great

Basin. The copper of Lake Superior and of Arizona is of very high importance.

Natural History.—The zoology of North America is rich and varied. Here occur the bison (nearly extinct of late), the musk-ox, the Rocky Mountain sheep, two antelopes (the pronghorn and the Rocky Mountain goat, the former remarkable as the only antelope with branched horns, and the only one known to have deciduous horns), the reindeer, the elk or moose, the wapiti and several other deer, five species of bear, the walrus, sea and river otters, fur and hair seals, wolves and foxes of various species, the beaver, several hares, the raccoon, the marten, mink, and skunk, two or more marmots, a true polecat, a badger, the wolverine, and a large number of minor fur-bearing and other mammals. There is only one marsupial found—the opossum. Of feline animals, the puma and lynx are the most widely diffused; the jaguar and ocelot are found in the warmer latitudes, where occur the peccary, and even the tapir and other South American forms. Tropical North America has not nearly so many species of the monkey tribe as occur in South America. In Mexico and Central America, there are found many animals of distinctly South American type. The avi-fauna is singularly rich. All the humming-birds are strictly American; but the North American species are far less numerous than the South American. The vultures of America are entirely distinct in structure, though not in habits or appearance, from the old-world species. Many American birds are very rich in plumage; the song-birds, as a rule, are more remarkable for sweetness and delicacy of note than for volume of sound. A very large proportion of the known species of tailed amphibians are North American. Of the animal kingdom, it is believed that North America has afforded only one native species now truly domesticated—viz. the common turkey. The native tropical American fauna is one of the richest and most strongly marked anywhere known. Among reptiles, we find the rattlesnakes (some of which are South American). The 'Gila Monster' (*Heloderma horridum*) is the only venomous lizard known in any part of the world. There are many valuable food-fishes occurring in the rivers and seas.

The flora of North America has strong marked features of distribution. The plants of the far North belong in many instances to species which are natives of Europe also. The flora of the Atlantic States has many species and genera in common with that of Eastern Asia. Many of the Atlantic species are remarkable for an extensive range north and south, which persists in spite of great local differences of climate. The West Indian flora (essentially South American) would appear to have only of late invaded peninsular Florida, along the southern shores of which it has established itself to a remarkable degree. Westward, the highlands of Mexico seem to have acted as a barrier against the northward spread of tropical forms. North America abounds in great forests of valuable timber-trees in great variety. Most of the trees are congeneric with European timber-trees; but only a few arboreal species are found alike on both continents; neither are there many species found on both sides of the Rocky Mountains. The dense forests of the Pacific slope are largely made up of coniferous trees, mostly of species not known on the Atlantic slope. Mahogany, logwood, and lignum-vitæ are extensively produced in the tropical section. Since colonisation began, a very great number of European plants, chiefly grasses and weeds, have naturalised themselves in the country. Of cultivated North American native plants, we may specify tobacco, maize, the common potato (perhaps originally South American, as the tomato is), cacao, vanilla, and some species of melons; also gourds, beans, capsicum, and indigo.

Ethnology.—The native peoples of North and South America alike would appear to have been all of one race, although the Eskimo of the far North resemble the 'Indian,' or copper-coloured native races, not so much in appearance and in physical features, as in the polysynthetic or incorporative character of their system of word-building. This polysynthesis differs in kind as well as in degree from the agglutination observable in so many North Asiatic languages. It has indeed no exact counterpart in any Old-World tongue, but something resembling it is seen in the language of the Basques. The polysynthetic languages have, as a rule, very long words, or combinations, which in fact represent sentences rather than words. The number of native languages and dialects is very great indeed; and in such languages as have received no alphabetic standard, the vocabularies and pronunciation of words are subject to continual changes. Further notice of the red men and of their ancient centres of semi-civilisation is contained in the article AMERICAN INDIANS.

The present population of North America contains a copious element of the Indian stock, chiefly found in the remoter parts of Canada and in Mexico and Central America. In Spanish America and in Manitoba (Canada), there are many persons of mixed white and Indian origin. The Spanish language is spoken in Central America, Mexico, Cuba, and Porto Rico; French prevails in parts of Canada and Louisiana, and in some of the West Indies; and a German dialect prevails locally in Pennsylvania. But by far the largest share of the North American people are English in language, if not in descent.

Antiquities.—In addition to the facts cited in the article AMERICAN INDIANS, it may not be amiss to notice here certain geographical areas noteworthy for some peculiarities in respect of their archæological remains. It may be said in advance that most of the more modern authorities reject the theory that the interesting earthworks and other remains of remote antiquity in America are to be ascribed to a race of 'mound-builders' distinct from the present stock of Indians. The fact that the semi-civilised peoples of Arizona and New Mexico have plainly and unmistakably the same general characters as the other aboriginal races seems decisive on this point. The works of the 'mound-builders' are chiefly found in the Ohio and Mississippi valleys; but examples are to be met with at least as far north as Winnipeg. Those of Wisconsin are frequently built upon a ground-plan evidently designed to imitate the form of some animal, as the tortoise, serpent, bear, or even man.

Farther south they are generally pyramidal or conical, and most of them truncated. They are usually of earth, or of earth and stone. Many are clearly sepulchral, others apparently designed for sacrificial or other religious purposes, and a few seem like fortifications. Not infrequently the mounds proper are inclosed by square, circular, or polygonal earthworks, often very regular in outline. The sepulchral mounds often contain human remains, as well as weapons and utensils of stone, bone, or native copper. The style of art here observed is, for the most part, decidedly that of the existing North American tribes. Yet the mounds indicate a degree of persistent labour not to be expected of savage tribes, and suggesting a condition of organisation superior to that found among the northern Indians. In many instances the mounds are overgrown with large trees, and there is no doubt that many are of great age; but, again,

there are mounds which, according to the traditions of settlers, were built within the historic period; and to some of these a fixed date is assigned in local annals. This, however, is open to doubt.

The now unpeopled cliff-dwellings of the Arizona cañons recall the similarly-situated prehistoric houses of the Balearic Islands, and the cliff-towns of the island of Thera (Santorini) in the Ægean, which last are still inhabited. When the Spaniards conquered Central America they found cañon towns with many inhabitants. Certain loftily-built mesa-towns (like Acoma, in New Mexico) are entirely paralleled by such places as Albinnen, in Switzerland, which is only accessible by means of a succession of wooden ladders. There is, however, reason to assign to many ruined North American towns a very high antiquity, since the irrigation-works which sometimes are found near them could not have been available or useful except in times when the climatic conditions were very different from what we observe at present in those arid regions.

The far more remarkable architectural remains of the old Mexican, Peruvian, and Nicaraguan civilisations are noticed under the names of their respective countries. Perhaps independent of all these was the very noteworthy advancement of the Chibcha race in Colombia.

Political Divisions.—The political divisions of North America are (1) Danish America—that is, Greenland. Three small islands of the Virgin group were sold to the United States in 1916–17. (2) British North America—the Dominion of Canada, Newfoundland, Labrador, the Bermudas, the numerous British West Indian islands, and British Honduras. (3) The United States, including the detached territory of Alaska. (4) Mexico. (5) The Central American republics of Honduras, Guatemala, Salvador, Nicaragua, and Costa Rica, together with part of the republic of Panamá, the rest of which is on the South American side of the Isthmus of Panamá. (6) The West Indian republics of Cuba, Hayti, and San Domingo. (7) The Dutch West Indies. (8) Colombian islands (see below: *South America*). Some of the West Indian islands are more South American than North American in character. See table near the end of this article.

The population of North America is over 144,000,000, of which probably 6,000,000 are of pure or mixed Indian descent. The very great majority of North American Indians are found in Mexico and Central America. The people of African stock number over 10,000,000, most of whom are natives of the United States. The original slave element was derived from almost every coast-region of the African continent.

Colonisation.—The original colonisation of North America, so far as Great Britain was concerned, was for the most part a true *emigration*, by families, and was chiefly voluntary; although Great Britain, as well as several other European countries, both before and after the American Revolution of 1776, shipped many convicts and paupers to America. The immigration from England and Scotland has mainly fixed the type of civilisation alike in the United States and in Canada. The French colonisation was a very different affair, carried on largely at the public expense, and receiving the fostering care of church and state alike. Spanish colonisation was to a great extent the work of adventurous persons, bent on the acquirement of fame and fortune in the gold-fields. The Dutch settlements were almost purely commercial in their spirit. The large and early German immigration was, in a great degree, the movement of members of Protestant dissident sects to a land of religious liberty; but other causes operated. It was partly a result of the Franco-German wars of the 18th century; it was also due to economic pressure. Irish immigration began as early as Cromwell's time, and was at first in part compulsory. After the year 1845 it immensely increased in volume. The newer German movement to America grew to be a very large one. Many thousands of Scandinavians have in recent years found homes, chiefly in the northern part of the Mississippi Valley. There has also been a large and quite recent Slavic influx, chiefly Polish, Czech, and Yugoslav, to North America. (See also DUKHOBORTZI.) Italy, too, is sending out many settlers, chiefly of the humbler labouring classes. The so-called Hungarian element has been largely introduced on labour-contracts, which often provide for the return of the labourer, after a fixed time, to his own country. This system is liable to many abuses, and in the United States its exercise is forbidden by law. The introduction of Chinese labour, on a similar contract-system, is also illegal in the United States, while the Japanese are strongly discouraged from entering the country.

North America has for more than two centuries been the principal objective point for European emigration. This has been chiefly directed to the United States, where public lands have been sold on the most liberal terms, or given to actual settlers. As a consequence, the amount of public land suitable for agriculture became greatly reduced. Since the overthrow of the slave system in the Southern States, that section has attracted many settlers. The system of quotas by the laws of 1917 and 1924 has, however, limited considerably the number of immigrants, especially from southern and eastern Europe. In Canada there are still vast and unoccupied areas of fertile soil available for settlement. Mexico has much unoccupied territory, but its climate and social conditions render it less attractive to immigrants from the north than to those from the south of Europe. For the former, the United States and Canada are more suitable, since for the most part no process of acclimatisation has to be gone through. European immigrants, as a rule, live out the full term of their years in North America, and life-insurance tables assign a longer probable term of life to Americans than that agreed upon by European insurance companies. The diseases the immigrant has to encounter are much the same as those of Europe. Pulmonary consumption is common in the Atlantic States, especially in places where the soil-moisture is great and changes of temperature frequent and extreme. Malaria formerly prevalent, especially in Panamá and Central America, and in places having alluvial soils, is no longer the scourge that it used to be. Fevers and intestinal troubles appear to prevail more extensively in southern than in northern latitudes. There are theorists who hold that the European race in North America must decline in vigour and in physical and mental strength; but the facts do not appear to warrant any such opinion.

The intermarriage of white persons of different national origin may ultimately lead to a modification of the now familiar American type of figure and feature. The American of European descent is often spare and even delicate in outline, and slightly taller, on the average, than his European relative. Activity and quickness are common mental and physical attributes. Mechanical invention is a field in which American enterprise has greatly distinguished itself. The struggle for wealth and for material success is intense in North America, and as a consequence intellectual pursuits, literature, and the fine arts have had less encouragement here than in some of the mother-countries. Nevertheless, popular education is nowhere better provided for than in the United States and Canada. Institutions for the higher education

are numerous, and many of them are well endowed and highly efficient. What may be called the American branch of English literature is already noteworthy for the volume, and for the increasing value of its outcome, the tendency being towards a higher standard of literary merit. In science, the American mind has very naturally been turned towards practical rather than theoretical work; yet, even in pure science, much excellent work has been done in America.

It may be added that the prejudice which undoubtedly exists in some parts of Europe regarding all things American has led, and does still lead, some critics to minimise and undervalue American science and literature. It may be confidently asserted that life in the New World is neither so sordid and materialistic as hostile critics would have the world believe, nor yet so ideally perfect as mistaken patriotism might claim. It may be further said that the poor man, as a rule, has a happier and more hopeful lot in America than he can have in an old country, where social conditions are long established and comparatively unyielding.

It is stated by many observers that in Mexico and Central America the Indian element is gaining upon the white, and that the 'Ladino' (half-breed, or mixed) element is becoming more and more Indianised. Such statements should be received with caution, since trustworthy census reports are entirely wanting. It is certain, however, that in recent years there has been a marked decline in the number and extent of those civil wars which have formed such a prominent feature in Spanish-American life. Railways have also met with great extension, and there is a strong movement for the introduction of popular education, and the development of material resources. Brigandage and assassination have also been much repressed. The quiet and uneventful life of these countries in time of peace seems, to a traveller of northern origin, a proof of the indolence and lethargy of the people. The pursuits of the natives are pastoral rather than agricultural; and their manner of life is at once oriental and medieval—oriental in its dreamy, aimless, and leisurely methods, and medieval in the lack of public feeling of the people generally, as much as in their simple credulity, and their unquestioning charity towards the poor.

The details of the agriculture of North America, as well as those of its manufacturing and mining interests, its canals, railways, and telegraphs, are more fully noticed under the heads of its respective states, especially in the articles on the United States and Canada. About nine-tenths of North America is in what is called the temperate zone, though we have seen that a considerable share of this region has an arctic climate. In like manner, a considerable part of tropical North America has a temperate, or even a cool climate. This is especially true of the plateaus of Anahuac and Oaxaca in Mexico, where the altitude is such that the temperature is singularly cool and equable, though the country suffers from drought. The region properly called *Central America* is the high mountainous body of land between the Isthmus of Panamá and that of Tehuantepec. This part of the continent is very humid, but most of it is so high as not to have a very hot climate; and on the eastern coast the strong and steady trade-winds not only moderate the heat, but render the low and marshy coast remarkably healthful for a tropical region. The West Indies are subject to terrible hurricanes; the interior of North America is often visited by destructive tornadoes.

South America has much the same general shape on the map as North America, and the semi-continents have many features in common, as well as certain marked contrasts. The broadest part of each is towards the north; but the northern portion of North America is a frozen and most repelling region; while the Caribbean Sea, which lies north of the southern half of the continent, is entirely tropical, and is encircled by a chain of rich and beautiful islands, where frosts are never seen. The climates are therefore reversed. The greater portion of North America has either a cold or a temperate climate; while that part of South America which is of corresponding position and importance has a hot climate. The tropical region of North America is relatively small in area; while in South America it is much the smaller part which has a cold climate. Moreover, the winter cold of Patagonia, Fuegia, and the Falkland Islands is never extreme, like that of so great a part of North America. The summers are relatively cold, but the winters are correspondingly mild, and the climate is more steady and less changeable than that of North America. The summers of the Falkland Islands are certainly much cooler than those of London, which has a corresponding north latitude; but the Falkland winter is not much colder than the summer. In short, the climate is chilly rather than cold, and damp rather than wet (for the rainfall, though almost continual, is really small).

The Andes, or South American Cordilleras, have some features in common with the great North American Cordilleras, the Rocky Mountain system. They both extend north and south; both are near the west coast; both are volcanic; and both cut off the rains from a considerable region, rendering the climate locally very dry. But the Andes are much more nearly continuous; they are a much more complete barrier to the traveller and merchant, as well as to the rain-bearing winds of the Atlantic; they have a much greater absolute height, and contain a far greater number of very lofty peaks. Their volcanic activity is also at present much more intense than is seen at any point in North America north of the Tehuantepec Isthmus. The dry or desert region west of the Andes is far more extensive and far more completely arid than the corresponding section of North America. The Andes, for a great part of their course, are disposed in two or three somewhat closely parallel chains, running near each other. In Bolivia and Peru they inclose the land-locked plateau of Lake Titicaca, and in Bolivia the land-locked plateau of the Desaguadero, 13,000 feet in height, with an area of 30,000 sq. m. The highest peak in South America is Aconcagua (23,080) in the Chilean Andes, but there are many mountains in the Andes (q.v.) over 20,000 feet in height. Towards the north, in the republic of Colombia, a high and rugged chain runs off to the north-east and east, forming the coast-mountains of Colombia and Venezuela. South of the Orinoco and north of the Amazon lies the great quasi-peninsula of Guayana, a mountainous region, only a small part of which is well known to geographers.

The mountains of Brazil have been likened to the Appalachians of North America, which they resemble in having an eastward situation. But, unlike them, they have no marked regularity in course, or uniformity of character. The main system seems to divide the Amazon basin from that of the La Plata, sending branches out to the north, so as to separate from each other the various basins of the main Amazonian tributaries. An elongated ring or ellipse of mountains encircles the great valley of the river São Francisco, and another range, the Serra do Mar, runs near the east coast. Farther west is the Serra Mantiquiera, regarded as the main chain of the Brazilian mountains; while the watershed between the north and the south flowing streams is called the Serra dos Vertentes. Barely one-fifth of Brazil is truly mountainous. In

point of geologic age, the Brazilian mountains are much older than the Andes. They are largely made up of gneiss and gneissoid rocks. The Guayana mountains much resemble them. To the east of the Andes, and as it were reclining against them, there is an enormous and lofty plateau on which are scattered various extinct or dormant volcanic peaks; but the western slope of the Andes is usually very steep. In some parts of the eastern sub-Andean plain there appear complicated (but generally north and south) ranges of lower mountains, occasionally sending out an arm of hills into the plains of the interior. The really temperate part of South America, including most of Chile, Uruguay, and the Argentine Republic, has a mild, and for the most part singularly equable and agreeable, climate; although Northern Chile is a hot and arid desert, and the southern third of that country, including the Chonos Archipelago, is drenched with continual rains. The greater and most characteristic region of South America is the tropical portion. For a tropical country the climate is in general remarkably fine, regular, and healthful. A marked feature is the large and regular rainfall, caused by the Andes, which here stand exactly across the course of the trade-winds. These winds, carried gradually upwards by the shelving plateaus, till they reach the cold Andean summit-region, precipitate nearly all their moisture, and leave the narrow strip of land west of the Andes a desert. Towards the north and south, the Pacific slope, being out of the highway of the trade-winds, receives abundant moisture from the Pacific. Owing to the enormous rainfall of tropical South America, it is above all others the land of great rivers. The three great river-systems of the Orinoco, the Amazon, and the Plata are all primarily developed upon the eastern terraces of the Andes; but the Plata derives its main water-supply from the Brazilian mountains. Other large rivers are the Magdalena in Colombia, the São Francisco in Brazil, and the Río Negro in the Argentine Republic. Among the tributary branches of the three great rivers there are many streams which for length and volume take rank with the world's largest rivers. South America has few large lakes, Lake Titicaca being one of the most remarkable; but the slopes of the Southern Andes abound in smaller lakes, doubtless of glacial origin. The lake of Maracaibo, in Venezuela, is a landlocked and tideless gulf or arm of the sea.

The interior of South America presents considerable variety. In the central and southern portion of Venezuela we find extensive steppes or prairies, here called llanos; an open region, in part treeless, but in general grassy and devoted to pasturage. To the east and west of these the country is for the most part densely wooded. The vast forest-clad plain of the Amazon is of fluviatile origin; and although the river is said to have no true delta, the inland forest through which its waters flow may be said to be of the true delta formation, being everywhere cut by spill-channels and creeks which derive their water from the main river. These channels, together with the Amazonian tributaries, afford in the aggregate a vast, and thus far uncomputed extent of inland navigation. The land portion of this whole region is closely forested, and in extent, density, and average height of trees, it is probable that its woodlands have no rivals in any part of the world. In the more central and elevated parts of Brazil, leaving the wooded river-valleys, we find a vast extent of open grassy plains, or campos, crossed with granitic ridges. Towards the southern tropic we encounter a region which, though little developed, appears to be one of the finest and most fertile on the globe. Farther south the forests begin to disappear, and finally end in the great treeless pampas of the Argentine Republic. It may be remarked that, even in the equatorial region, the high valleys and plains of the Andes enjoy a wonderfully mild and agreeable temperate climate, while the higher mountain-slopes have a perpetual winter. Between the Argentine pampas and the forest region to the north, is the vast wilderness of the Gran Chaco, where strips of forest intervene between grassy plains and dry scrubby ridges. Some of the lower plains are subject to overflow in the rainy season. The Patagonian region south of the pampas consists largely of a succession of terraces rising westward to the Andes, and crossed by many swift and copious rivers. Here are seen vast fields covered with loose stones and shingle, recalling the enormous boulder-covered waste of Labrador. Almost equally remarkable are the 'stone-rivers' of the Falkland Islands—long valleys nearly filled with loose stones. Farther south lies the Fuegian Archipelago, a gloomy and unpleasant region with a bleak climate. Large areas of the islands are densely wooded, and much of the surface is broken and precipitous. Not only is the Andean region in many parts full of active volcanoes, but the country near it is to a singular degree liable to earthquakes, which are of special frequency in Chile, Peru, Ecuador, and Venezuela; and at some points on the Chilean coast the earth is said to be constantly shaken by earth-tremors.

The *mineral wealth* of South America is very great. The gold, silver, copper, mercury, and other valuable metals of Peru have given it a proverbial, though really undeserved, reputation for wealth. The desert country on the Chilean coast is rich in nitre (nitrate of soda), valuable iodine compounds, and borax. Its guano, formerly abundant, is now nearly exhausted. The copper and silver of Chile have been a great source of wealth; and its coal, though not of the Carboniferous period, promises to become of very high importance. Bolivia contains the celebrated silver-mines of Potosí. Venezuela and Guiana afford considerable supplies of gold; and very rich discoveries of the same metal have been made in Patagonia. Coal occurs in Brazil, and at various points southward. It is mined on the north shore of the Strait of Magellan. Brazil is celebrated for its diamonds.

The *plant-life* of South America is singularly rich and varied. Potatoes, maize, tobacco, pine-apples, vanilla, cacao, and tapioca are all considered to be native American, and probably South American products. Among native medicinal plants are numerous species of trees whose barks yield quinine. Ipecacuanha, coca, copaiba, sarsaparilla, and jaborandi are among the many native drugs. The forests yield india-rubber, rosewood, divi-divi, Brazil nuts, and maté or Paraguay tea. Here grow the cow-tree and a large number of species of forest trees affording ornamental and cabinet woods. The plant-life of the tropics is redundant; and the forests are often so dense and so entangled with woody vines as to be impenetrable. In South America the flora is essentially a tropical one, varying much from the Old-World type. There are some plants which are common to North America, but these would seem to have been propagated along the high western sierras. The flora west of the Andes, especially in the far south, is very distinct from that of the main body of the continent, and has quite a number of genera and species in common with Australia, New Zealand, and South Africa, and even with Southern Asia.

The *native animals* of South America are of many species. Except the dog, the llama and alpaca are believed to be the only native species of mammalians ever truly domesticated by the American

Indians. Both of these, with the vicuña and guanaco, are of the camel tribe. The llama is used to some extent in Peru as a beast of burden. It also affords wool, but not of so fine quality as that of the alpaca. Among the wild beasts of prey are bears, pumas, jaguars, ocelots, and several kinds of wild-cat. Foxes, skunks, raccoons, otters, the nutria or coypu, and several species of deer are known; as also several remarkable rodents, among them the agouti, the cavies, the capybara, the chinchilla, the viscacha, and some porcupines. The monkeys are of a great many species, all remarkably distinct from those of the Old World. South America is the home of most of the living species of edentates, such as the sloths, armadilloes, and true ant-eaters. Here also are found several species of marsupials. Other animals are the vampire bats, tapirs, peccaries, &c. Among the great serpents are the anaconda and the boa-constrictor. The venomous species include rattle-snakes, coral-snakes, and the dreaded bushmaster or lachesis. The birds are of extremely numerous species, and many are of wonderful brilliancy. Among them are the condor, the rhea, the toucan, and countless parrots and humming-birds. The fishes and insects are vastly numerous, both in individuals and species. The mammalian remains of the tertiary and quaternary strata of South America are scarcely less interesting than those of North America. The Palæotherium and Anoplotherium; the huge edentate Glyptodon and the ground-sloths (among which is the enormous Megatherium)—these are among the interesting extinct South American mammalian genera, of which as a whole our knowledge is as yet very imperfect.

The *agricultural capabilities* of a large part of South America are unquestionably very great. Stock-breeding is the leading industry on the pampas of the south, and on the llanos and campos of the north. Coffee-growing is a prominent pursuit in Brazil. The cereal grains thrive remarkably in the temperate regions. Sugar, tobacco, and cotton are produced in the warmer latitudes. Silver, copper, iodine, nitrates, guano, hay, and provisions are shipped from the west coast. From the La Plata countries wool and various cattle products are very important exports. Wheat is raised and shipped in rapidly increasing quantity. Peruvian bark and other medicines, rubber, cabinet-woods, chocolate, tobacco, and fruits are shipped from the tropical and forest regions of the north.

The *aboriginal population* of South America is noticed in the article AMERICAN INDIANS. The white population is largely Spanish in language and descent, except in Brazil, where Portuguese is spoken. The common people of Chile are largely of Galician (Spanish) descent; while Basque blood is said to prevail in Peru. The Brazilian whites are to a considerable extent of Azorean and Madeira stock. There are numbers of German colonists in Brazil, the La Plata countries, and Chile; and also many Italians, Basques, and other Europeans in the Argentine Republic and Uruguay. The English language is spoken in the Falklands and in Guiana; French and Dutch prevail in parts of Guiana. The negro element is strong in Brazil, in parts of Peru, and in Guiana; and there are many persons of mixed descent. It is believed that the total population of South America is about 64,000,000.

A considerable number of the islands usually reckoned as West Indian, and assigned by most geographers to North America, are really continental and South American. Such are the large British colony of Trinidad; the Venezuelan island of Margueríta; and the Dutch island of Curaçoa. But the Colombian (and English-speaking) islands of Old Providence and St Andrews, though politically South American, are scarcely to be considered as South American islands. It may further be observed that the West Indian Islands, though from their latitude they are reckoned North American, are throughout marked by a flora which has few distinctly North American features; while their rather meagre indigenous animal-life is, for the most part, very clearly South American in its prominent characters.

A comparative view of the various countries of South America reveals many interesting points of likeness and contrast. The *Republic of Colombia*, in the north-west, presents an area about as large as France, Spain, and Portugal together. The coast-region and the large river-valleys have a hot climate, and afford almost every staple product of the inter-tropical zone; but a great part of the country is so elevated that its climate is a perpetual spring, and its products are largely those of temperate regions.—*Venezuela*, with vast tracts of unutilised land, presents many of the same conditions as Colombia. Cattle-breeding is here a leading pursuit, and coffee and cacao are among the principal articles of export. Venezuela is larger than France and Germany combined.—*Guiana* (British, Dutch, and French) is a region of dense forests, heavy rains, and intense heat. The seaward and well-settled parts are low and alluvial, but not really very unhealthy, except in the French colony. The area of the three colonies is about that of Sweden.—*Ecuador* consists of three distinct districts: the hot Pacific slope, rich in tropical products; a central mountain-valley region, with a delicious temperate climate; and the eastern and altogether wild and nearly unpeopled forest region east of the Andes. Ecuador has about the area of Italy. Its present conditions are not favourable to immigration.—*Peru*, with a proverbial wealth of mineral resources, and a railway system better developed than that of almost any other South American country, proved only a feeble antagonist in the Chilean war of 1879–81, which deprived the country of some of its most valued resources. For area, Peru, excluding Tacna and Arica, may be compared with France, Italy, and Spain taken together.

The great republic of *Brazil* is larger than the main mass of Europe without its great peninsulas, and its natural resources are commensurate with its extent; but only a very small portion of these is developed. The mineral wealth of the country is large. Brazil, for many and obvious reasons, is a field more attractive to emigrants of the Latin races than to those of the more northern European nations; yet its southernmost provinces have a fine and temperate climate, and a very fertile soil.—The *Argentine Republic*, a country with excellent agricultural and pastoral capabilities, is progressing at a rapid rate. Its climate is in general adapted to the European constitution, and it is attracting European immigrants in large numbers. It is a large country, about six times the size of France.—*Uruguay* is a small but prosperous country, resembling the Argentine Republic in its conditions.—*Paraguay*, while somewhat larger, is less progressive.—The large republic of *Bolivia*, now everywhere cut off from the sea, is the least developed country in South America. Its surface includes several lofty and arid mountain plateaus, rich only in minerals; lower tablelands with a delightful climate, in part fertile, and in part almost a desert; and the still lower tropical and highly fertile Amazonian forest region, with almost entirely unexplored districts of great extent.—*Chile*, on the Pacific coast, is quite cut off by high mountains from easy communication with the interior. The northern part is a desert, invaded only for its mineral wealth; the extreme south has a chilly and very wet climate; but the main part of the country is extremely fertile, and has a very pleasant and

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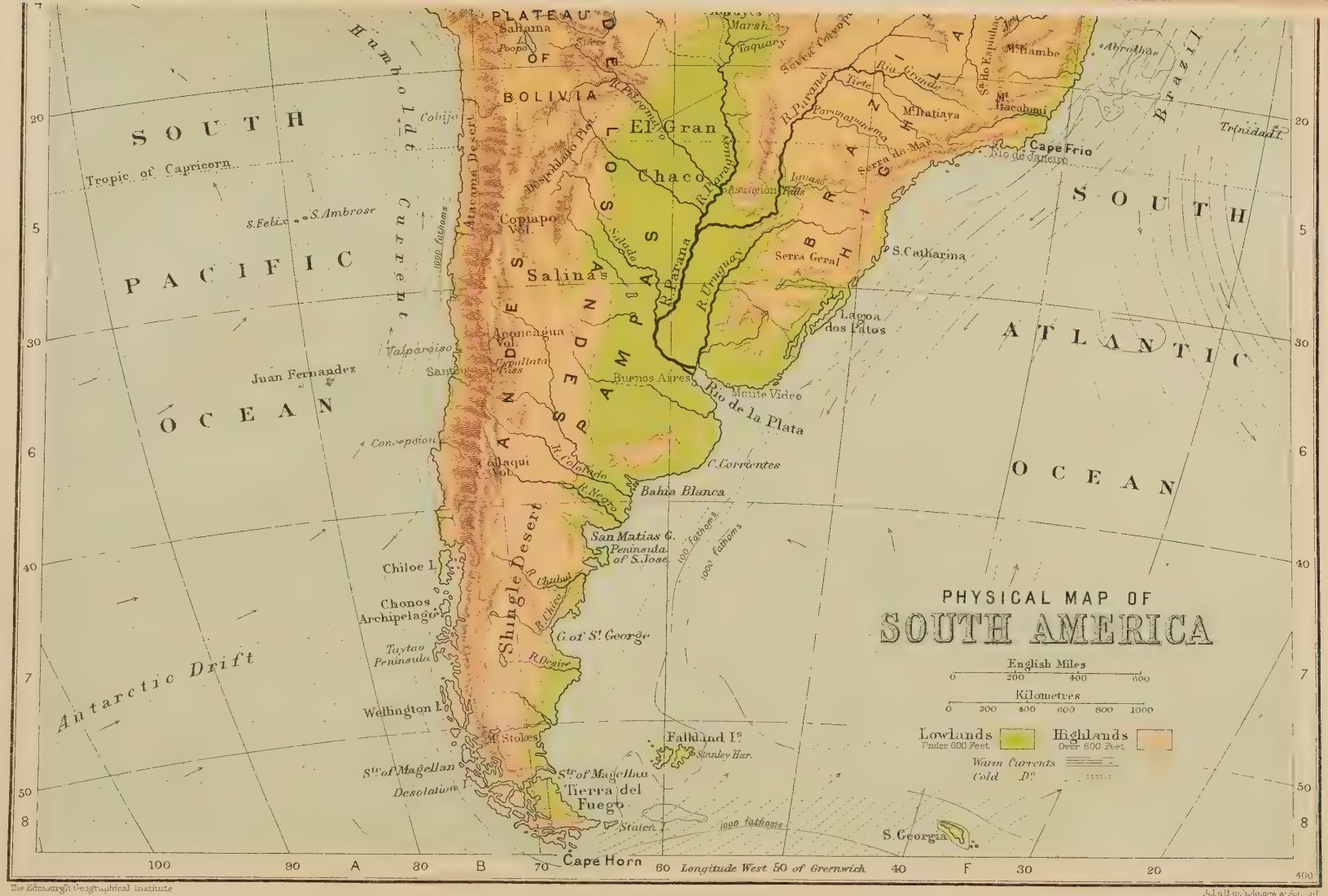

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healthful climate. Chile is a prosperous and wealthy country. Some parts present very great attractions to the immigrant. See also CENTRAL AMERICA, and the articles on the various American countries, as Canada, United States, Mexico, and Peru; Stanford's *Compendium of Modern Geography;* the works of Hayden and Selwyn on North America, and of Bates on Central America, the West Indies, and South America; also Shaler's *Geography of North America.* For the discovery by Norsemen, see the article VINLAND; for the mythical discovery by Welshmen, see MADOC; on the discovery and early history, see various works by Harrisse (1886–1900); and Winsor's *History of America.* In the following tables the polar regions (1,000,000 sq. m.) are not comprised; the populations are for 1910–21.

NORTH AMERICA.	Area in square miles.	Population.
United States	3,615,764	105,765,656
Canada	3,653,946	8,769,489
Newfoundland (with Labrador)	162,200	267,330
Bermudas (British)	19	21,987
British Honduras	8,600	45,317
Greenland (Danish)	320,000	13,449
St Pierre, &c. (French)	93	3,913
Mexico	767,000	15,115,612
Salvador	7,225	1,287,722
Nicaragua	49,200	638,119
Honduras	46,250	637,114
Guatemala	48,300	2,003,579
Costa Rica	23,000	468,373
Panamá	32,380	423,286
Total	8,733,977	135,460,951
WEST INDIAN ISLANDS.		
Hayti	10,204	2,500,000
Dominican Republic	18,045	897,405
Cuba	42,215	2,899,705
Puerto Rico (United States)	3,600	1,299,809
Jamaica (British)	4,400	864,603
Trinidad "	2,000	377,021
Barbadoes "	166	186,656
Windward Islands (British)—		
Grenada	133	73,373
St Vincent	132	44,447
St Lucia	233	51,505
Leeward Isles (British)—		
Antigua and Barbuda	170	32,269
Montserrat	32	12,120
St Kitt's (and Anguilla) with Nevis	150	38,214
Dominica	305	37,059
Part of Virgin Islands	58	5,033
Bahamas	4,400	53,031
Guadeloupe, &c. (French)	680	229,322
Martinique, &c. "	381	244,439
Curaçao, Saba, &c. (Dutch)	403	53,702
United States Islands (in Virgin group)—		
St Thomas	29	26,051
St Croix	85	
St John	24	
Total	87,845	9,926,314
SOUTH AMERICA.		
Venezuela	398,594	2,411,952
Colombia	440,000	5,855,077
Ecuador	116,000	2,000,000
Peru	722,461	4,500,000
Bolivia	514,155	2,889,970
Argentine Republic	1,158,119	8,284,266
Uruguay	72,210	1,407,247
Paraguay	61,600	1,000,000
Chile	289,900	3,754,723
Guiana (British)	89,500	297,691
" (French)	32,000	49,000
" (Dutch)	46,000	113,181
Brazil	3,275,570	30,645,296
Falkland Islands (British)	7,500	3,241
Total	7,218,609	63,211,644
Grand Total of America	16,040,431	208,598,909

The *history* of America does not begin until 1492, when Christopher Columbus first sighted American land (probably Watling's Island in the Bahamas). We have abundant reason to believe, from the evidence of prehistoric archæological studies, that men have lived in America from a very remote period. Regarding the earliest colonisation of the continent, we have no evidence at all as to the date, or place, or source of any such movement. It is certain that there were, 500 years before Columbus, Norse colonies, not only in Greenland, but much farther south. But these colonies had perished or been abandoned, and were altogether forgotten in the days of Columbus. As to whether the Chinese records which speak of visits paid by junks to a far-distant eastern land, in reality have any reference to America, opinions may differ. Most of the critics who have thought the matter worth alluding to at all have either ridiculed the idea that the Chinese ever visited America before the time of Columbus, or else have regarded such visits as having no possible value as historical events. But others have pointed out many particulars in which the Peruvian civilisation seems to have resembled that of China, and from these resemblances have inferred that the Peruvians derived their advancement from the Chinese. That the Polynesian race, on the other hand, should have colonised almost every habitable island as far as Easter Island, and never once have crossed the remaining and comparatively narrow strip of sea to Western America, seems very strange; and the fact that wampum, or money made of shells and strung together, is current in Micronesia as formerly in North America, appears to have some significance. It is, moreover, well known that under Spanish domination numbers of people of Malay race were settled in and near Acapulco; although this factor now seems to have been entirely absorbed by the older social elements. There is very little doubt (though the fact has been disputed) that America was named in honour of Amerigo Vespucci (Americus Vespucius), a Florentine, who first visited the New World in 1499. It is believed that one Hylacomylus (or Waldseemüller), a German, first named the new land America. At first it was supposed to be a part of Asia; for this reason its native people were, as they still are, called Indians. Many Spanish, Portuguese, French, and English explorers soon pushed across the sea to the newly-found world. But except the Spanish and Portuguese (who accidentally discovered Brazil in 1500, and soon colonised it), none of these founded any important American colony for more than a hundred years. In Mexico and Peru (both of them semi-civilised and rich in gold and silver), the Spanish occupation was a military conquest. Newfoundland, the oldest British colony, was not permanently settled much before 1610. The Dutch and French had each at one time large colonial interests in Brazil, of which only their Guiana plantations now remain. These, with some islands in the West Indies, are nearly all that is left to those powers of their once splendid possessions in the New World. The French in Canada were dispossessed by the English in 1762, but left their language and traditions there. Louisiana, another great and very costly French colonial experiment, was in 1803 absorbed by the United States. The English colony of Virginia dates from 1607; that of Georgia, the youngest not now under the British flag, was founded in 1733. The principal English colonies, 13 in number, became the United States of America in 1776. The Spaniards kept Florida until 1819, when it passed to the United States, which later absorbed Texas, Northern Mexico, and the Oregon

country. The English colonies north of the United States remained separate provinces until 1867, when the Dominion of Canada was formed. Newfoundland, including part of Labrador, remains a distinct colony.

British America is a name still sometimes given to what is now the Dominion of Canada, together with Newfoundland and Labrador. In a wider sense, it includes the Bermudas, the British West Indies (the Bahamas, Jamaica, Trinidad, Barbadoes, the Leeward Islands, the Windward Islands), also the Falkland Islands, and the continental colonies of British Guiana and British Honduras. The French and Dutch holdings are indicated in the table on the preceding page; and Hayti and the Dominican Republic are negro states.

Russian America was the ordinary name for Alaska (q.v.) before its purchase by the United States from Russia in 1867 for $7,200,000.

The once vast colonies of Spain, called Spanish America, are no longer Spanish, the last of them, Cuba and Porto Rico, having been relinquished after the war of 1898. Cuba is now independent, but Porto Rico was ceded by Spain to the United States. The term Spanish America is still used for Spanish-speaking America—viz. the Central and South American republics (except Brazil), Mexico, and San Domingo. Latin America includes Spanish-speaking America, Portuguese-speaking (Brazil), and French-speaking (Hayti and French colonies).

America Cup. See YACHT.

American Aloe. See AGAVE.

American Blight, the apple-bark plant-louse, or woolly aphis, which forms a cottony film on neglected apple-trees. It is said to have been imported into Britain from America in 1787, but this is doubtful. Cleaning the trees, choking the parasites with anything oily or sticky, treatment with tobacco-water, methylated spirit, and other washes, are among the suggested remedies. The name is applied also to species attacking other trees. See APHIDES; see also *Injurious Insects* (1885), by Miss Ormerod.

American Bowls. See BOWLS, SKITTLES.

American Cedar, or RED CEDAR, is not properly a cedar at all, but the Virginian Juniper (*Juniperus virginiana*). It is used, as was the so-called Bermudas Cedar (*Juniperus bermudiana*), for making lead-pencils, cigar-boxes, &c. See JUNIPER.

American Cloth. See LEATHER-CLOTH.

American Ebony, also called Jamaica, West Indian, or Green Ebony, or Cocos Wood (*Brya Ebenus*), is a small tree of the order Leguminosæ, with scented orange-yellow flowers and flexible spiny branches. The heart-wood, which is very hard and heavy and polishes well, turns brownish-black with age.

American Elemi, a balsam-resin, known also as Gomart, Chibou, or Cachibou, obtained from the West Indian Mastic-tree, or Turpentine-tree (*Bursera gummifera*), a tree of the order Burseraceæ.

American Indians. The American Indian is a large racial group derived from the yellow-brown stem of mankind in Asia, particularly its older portions. Comprehensively he may be regarded as one of the secondary races of mankind. The terms 'Red man,' 'Red race,' &c. are misnomers, for he is yellow-brown.

Peopling of America.—As there were no higher primates on the American continent, man could not have developed there, but must have come from other parts of the globe; and as before navigation was sufficiently developed he could not have crossed the oceans from Europe or Africa, he must have come from the only other proximate land, which is that of north-eastern Asia. The Eskimo came by the same route later.

Antiquity.—Man could not have reached America before he occupied all habitable Asia and reached its comparatively inhospitable north-eastern portions. This could possibly have been realised only in relatively recent post-glacial times. There are no indications that man has been in America more than a few thousand years. The various remains of man, both in North and South America, that have at one time or another been attributed to more ancient man were invariably on critical examination found to lack the essentials that would permit of a scientific confirmation. The earliest so far discovered cultural traces place the American man well within the Neolithic period. If he made unpolished stone implements, as he did, it was contemporaneously with more advanced forms and with pottery.

Causes and Nature of Immigration.—The conditions of north-eastern Asia favoured on one hand advance in quest of food-supply, but on the other precluded massing of people, and hence any mass immigration. The coming of the Asiatic man to America was doubtless in the main accidental, repeated, and in the nature of dribbling over rather than migration. It doubtless extended over more than one of the different practicable routes from the north of Bering Straits to the Aleutian Islands, and lasted up to very recent time, or until America was well peopled and offered resistance. Small parties of the latest Asiatics, the Japanese and Chinese, besides the Polynesians, may have reached parts of the west coast of the continent even more recently, as the Norsemen and perhaps others reached the eastern shores before Columbus; and there are suggestions that they may have brought and left certain cultural impulses, without themselves being capable of traceable survival.

Languages.—The question of the antiquity of the American Indian is generally linked with the multiplicity of his languages, it being assumed that these languages must have originated on the American continent and taken a long time for development. The native American population, though all belonging to the yellow-brown stem, shows considerable secondary physical heterogeneity, and there is every reason to believe that most of the differences were already brought to the American continent. A similar probability exists with regard to the languages. They also all belong to one great stem, though presenting various 'stocks,' some of which are almost as distant as the Semitic and Aryan; but these stocks, too, may well in the main be of extra-American origin. As more profound studies of the American languages progress, the actual number of these stocks, moreover, is steadily being reduced. Investigations under the auspices of the Canadian government indicate that the total number of linguistic stocks north of Mexico may be but six, and that possibly even some of these may eventually be shown to be related.

Cultures.—On coming into America, man brought with him his culture from Asia, and this culture, though evidently the same in fundamentals, differed in details, like the physique and language, according to time of immigration and group from which he was derived. On these foundations, and under the richer American environment, developed the native American cultures, which finally became essentially American. Much of the old, however, was retained throughout both Americas in religion, social organisation, mode of life, and general methods of behaviour.

Population: Development.—The multiplication of population under such favourable circumstances as

were offered by the new continent was doubtless rapid, as was the extension over all the better parts of the land. The latter was followed by increasing stability of geographical groups, their adaptation to the natural resources of their respective regions, and consequent cultural differentiation. In this way some of the groups remained essentially hunters or fishers, while others developed into stationary husbandmen, agriculturists, and builders of cities. It was these sedentary tribes which most rapidly advanced in culture, and which developed such remarkable culture areas and entities as those of the Ohio and Tennessee 'mound builders,' the Pueblo South-west, the Maya, Aztec, and Inca empires, and still others. The development of these cultures corresponds almost wholly to our Christian era; that of the Aztec and Peruvian empires to the last few centuries before the discovery.

Indians at Time of Discovery.—When America was definitely discovered, it was already peopled from one end of the continent to the other, including all the habitable outlying islands. The total number of inhabitants may have exceeded fifty millions. The Eskimo, as to-day, was confined to the farthest north, having never been strong enough to penetrate more southward. All the territories were already more or less definitely subdivided or claimed by the tribes. Of these there were a large number, the more advanced reaching the stage of confederations, of organised governments, and of class distinctions. Culture was advancing towards writing and in other directions, but the struggle for existence and that for power had increased far enough to involve the tribes in frequent warfare, which kept down the numbers. There was but little race consciousness or solidarity, and the white invaders had no difficulty in conquering the different groups with the help of others. It was largely the Indian who overcame the Indian.

White Man's Influence.—The white man's influence on the Indian was baneful. The two most potent agencies were, on the one hand, forcible religious disorganisation, followed by demoralisation; on the other, the introduction of diseases to which the native was not immunised, and which claimed collectively vast numbers of victims. Moreover, the white man brought with him a cultural and to some extent also intellectual superiority which was beyond the reach of the Indian. The result was the dethroning of the Indian from his sovereignty on the American continent, his weakening in every respect, and his giving way in territory and numbers, until to-day only in the Sierras and in the least accessible regions has he in small groups kept more or less his own.

The Present Status of the American Indian.—To-day the Indian is everywhere in the background. In many places he has been completely eliminated and already forgotten. His numbers have been greatly reduced, and where numerically he seems to keep up, it is by becoming more and more mixed with the white and other elements of the population. The total number of full-blood Indians does not now probably exceed in both Americas five millions. In the United States and Canada there are probably less than one hundred thousand. Only a small number of the isolated tribes still retain a semblance of independence. Whole large tribes such as the Hurons, Shawnees, Yungas, &c., have disappeared completely, or are in the process of going, through mortality and amalgamation.

The Future.—The future of the American Indian is plain: it is a partial further disappearance through disease, and amalgamation, more or less rapid according to region, with the rest of the white and other elements of the population. Before the end of the century he will have completely disappeared from the area of the United States, though there will be several million people in whose blood he has left traces. In the wilds of Canada and in the Spanish-speaking republics the process is slower, except in Argentina, where the Indian is already practically non-existent over the vast plains from the Chaco to Tierra del Fuego.

Physical Characteristics.—Notwithstanding the presence of four or five distinct sub-types and many localised differences, the American Indian presents—or presented—throughout many features in common which permit of general characterisation.

The Indian's colour differs, according to localities and habits, from dusky yellowish or yellowish-brown to that of solid chocolate; but the fundamental colour is moderate brown, or, more correctly, yellowish-brown.

The hair, as a rule, is black (to reddish-black after exposure); it ranges about medium to slightly above in coarseness, being never fine; and it is straight, except in the old or unkempt, where there may be slight irregular waviness, and in the men who wear long hair, where the free ends may show some tendency to turn upward. The beard is scanty, and on the sides of the face generally completely absent, and it is never long. On the body there is no hair except a little in the axillæ, and on the pubis, though even there it is usually sparse.

The Indian is generally free from special characteristic odour appreciable to the white man. His heart-beat is slow. His other functions are everywhere much alike. The size of the head and of the brain-cavity, though differing considerably in individuals and also to some extent with the mean stature of the tribes, averages on the whole slightly less than that of white men and women of similar height.

His eyes, as a rule, are above medium to dark brown in colour, with decidedly bluish conjunctiva in younger children, pearly-white in older subjects, dirty-yellowish in adults; and the eye-slits show a prevailing tendency, more or less noticeable in different tribes, to a slight or moderate upward slant; that is, the external canthi are frequently more or less higher than the internal. The children show a slight to moderate epicanthus.

The nasal bridge is moderately to well arched; the nose is frequently strongly developed in the males and often convex (aquiline) in shape, but is lower, shorter, and more commonly straight or even concave in the females; it is never very high, nor so fine or slender as in whites, nor again so thick and broad as in the negro; and its relative proportions in the living as well as in the skull (barring individual and some localised exceptions) are prevalently medium or mesorhinic. The malar regions are, as a rule, rather large or prominent. The suborbital fossæ are in general more shallow than in whites.

The mouth is generally fairly large to large, and the same is true of the palate. The lips average from medium to somewhat fuller than in whites, are never thin (except after loss of front-teeth and in case of alveolar absorption), and never so thick as in the negro; and the lower facial region shows in general a medium degree of prognathism, standing, like the relative proportions of the nose, nearly midway between those in the whites and those characteristic of the negroes, though frequently closer to the white. The chin is well developed, though on the average somewhat less prominent than in whites, and is not seldom square. The entire lower jaw is on the average somewhat larger than in whites. The teeth are of medium size when compared with those of primitive man in general, but frequently are perceptibly larger when contrasted with those of the cultured white American or European; the upper incisors of the Indian

present throughout, with rare individual exceptions, an especially important feature: they are on the inside, or lingually, characteristically shovel-shaped—that is, deeply and peculiarly concave, with marked marginal ridges. The ears are rather large.

The neck, as a rule, is of only moderate length, and never thin in health; the chest is somewhat deeper than in average whites; the breasts of the women are of medium size to somewhat above medium, and often more or less conical in form. In the females, the disproportion between the pelvic region and the shoulders is less marked than in whites. There is a complete absence of steatopygy, and the lumbar curve is moderate. The lower limbs are somewhat less shapely and generally less full than in whites; the calf in the majority is moderate, less than the average in either the whites or the negroes.

The hands and feet, as a rule, are of relatively moderate dimensions, and what is among the most important distinguishing features of the Indian, the relative proportion of his forearms to arms and those of the distal parts of the lower limbs to the proximal (or, in the skeleton, the radio-humeral and tibio-femoral indices) are in general, throughout the two parts of the continent, of similar average value, which differs from that of both the whites and the negroes, standing again more or less in an intermediary position.

In the Indian skeleton, from Canada to Tierra del Fuego, besides the characteristics hitherto mentioned, point after point of important resemblance or identity is met with which marks unequivocally the many distinct tribes as descendants of one and the same stem of humanity. Such features include, besides those relating to the skull, such highly distinctive traits as platybrachy in the humerus, platymery in the femur, and frequent platycnemy in the tibia; high frequency of perforation of the septum in the humerus, great rarity of the supracondyloid process in any form, and other conditions. There are many tribal or local differences in these respects, but on the whole the similarity of the skeletal parts throughout the continent is such that a classification of the Indians into more than one general type becomes quite impossible.

Mentally, on the average, the Indian differs considerably from what he is commonly pictured. In general he is not quite as fine, as sharp, as capable or mentally enduring, as sentimental or emotional, or as nervous or impatient as the White; but he is far from being the stolid, cruel, indolent savage that has often been described. He loves mirth, contentment, sport of all nature, war, but also work of his own choosing; he has special endowments in oratory, art, constructive technique, and ceremonial practices, with a good capacity for organisation; he has no sharper sight, hearing, or smell than the white man, but often reaches special aptitudes in these directions through training; otherwise he is much like the ordinary White brought up under similar circumstances and with as little education. The wife is not a 'slave,' but a full mistress of her house, children, and property; and the children, among unspoiled Indians, are as carefully and lovingly brought up as any others under similar conditions. That the Indian, while perhaps not absolutely equal, is close to the White man physically as well as mentally is shown by a total absence of race repugnance between the two races. Intermarriages are frequent; the union is generally stable, and the usually numerous children take at once their place among Whites. There is no social ostracism in their way, and their descendants may marry, if otherwise worthy, into the best of families, which is a tacit acknowledgment of the many good qualities of the Indian.

See *Handbook of American Indians* (Bull. 30, Bureau of American Ethnology, 2 vols., Wash., 1907, and subsequent eds.), containing encyclopædic information on all phases of Indian life north of Mexico, with extensive bibliography; Bulls. 33, 52, and 66, B.A.E., dealing with Man's Antiquity on the American Continent; *Ann. Reports* and *Bulletins* of the Bur. Am. Ethnol. and of the Smithsonian Institution; A. Hrdlička, *Physical Anthropology* (Phila. 1919), containing extensive bibliography on physical anthropology of the Indians; the *American Anthropologist;* the *American Journal of Physical Anthropology;* also Clark Wissler's *The American Indian* (1917); the anthropological publications of the Peabody Museum, Cambridge, Mass., of the American Museum of Natural History, N.Y., and of the University of California.

Americanism, in Catholic theology. See HECKER; and Braun, *Amerikanismus* (1904).

Americanisms occur more frequently in speech than in writing; indeed, American authors of repute seldom employ any but pure literary English words or constructions, save in dialogue, where colloquialisms and local dialect are freely introduced.

Americanisms are mostly of three sorts. 1. New words and phrases introduced into the English language in America. Instances are *ranch*, a prairie cattle-farm; *drummer*, a commercial traveller; *skedaddle*, to run away headlong; *joyride*, a quick drive for pleasure; *make good*, to succeed; *acknowledge the corn*, to yield a point in dispute. 2. Words or phrases long current in England, to which a new meaning has attached beyond the Atlantic. Such are *clever*, in the sense of amiable or even foolish; *smart* for clever; *store* for shop; *ugly* for ill-natured; *saloon* for bar-room; and *creek* for small stream or river. 3. Words now obsolete or dialectal in England, or words used in senses no longer familiar in England, as *chore* for errand, *sick* for ill, *cunning* for pretty, and *friends* for relations. Professor Schele de Vere, in his work, *The English of the New World* (1873), maintains that the larger number of so-called Americanisms are good old English words, which have become obsolete or provincial in the mother-country. This claim, however, cannot be upheld at the present day, if we take into account the modern slang so abundant on the American side of 'The Pond.'

As regards origin, some Americanisms (words and idioms) have been borrowed from non-English-speaking inhabitants and settlers of the United States, as, for example, from the Dutch in New York (*boss, caboose, loafer, spook, stiver, stoop*), the Spaniards in California (*corral, pirogue, vamose, cinch, ranch, cañon*), and the French in Louisiana (*bayou, cordelle, bateau, levee*). Words and phrases adopted from the German settlers in the western and middle states have been popularised by Leland's *Breitmann Ballads* in 'Pennsylvania Dutch'—*Dutchman* being an Americanism for German. From the Indians Americans borrowed, among other words, *mugwump* and *pow-wow; coyote* they got from the Mexicans; to negro influence we may trace such constructions as *done gone* and *this child*. But, considering the variety and mixture of races in America, such importations are relatively few in number, and the vast mass of Americanisms are of truly native origin, consisting of colloquial or slang usages applied to combinations of existing English words. Some of them are Americanisms only by virtue of the relatively greater frequency with which they are employed. Such are *I guess, I reckon, I presume, I calculate*, originally said to have been Puritan attempts to avoid the possibility of too definite a misstatement. To this class also belong *to fix* as the verb universal (*fix a meeting* = arrange; *fix myself up for dinner* = dress); *to run*, in the sense of to manage ('run a hotel,' 'run a railway,' 'Who runs this concern?'

&c.); *right* in the sense of quite or just ('right comfortable,' 'right here'); and *pretty* used perpetually for 'rather,' as *pretty bad, pretty nice,* and even sometimes *pretty ugly.* 'Is that so?' in the sense of 'Indeed!' or 'Really!' and the frequent use of 'sir' and 'ma'am' in addressing equals, are also Americanisms. Other phrases more redolent of the soil are 'not a red cent,' 'you bet your bottom dollar,' 'prospecting around,' 'toting a derringer,' and so forth. 'You bet,' as a strong affirmation, recalls the common gambling habits of the west. 'To hand in one's checks,' 'to go one's pile,' 'to hold the right bower,' belong also to the western gaming phraseology. To say that a business speculation 'pans out well' or 'strikes it rich' is obviously derived from Californian mining slang. Many phrases are evidently due to the direct influence of French ideas, and the love of the travelled American for Paris. *Baggage* for luggage, *valise* for small trunk, *depot* for railway station, *bureau* for office (and domestically for chest of drawers), *exposition* for exhibition, are cases in point. In many instances Americanisms proceed from the desire for brevity, as *pants* for trousers (pantaloons), *cars* for railway carriages, and *to wire* for to telegraph, the last now widely naturalised in England. On the other hand, where we say a lift, the Americans say an elevator; and, generally speaking, long or high-sounding words of Latin origin, which in England are mostly confined to serious writing, in America form part of the current vocabulary of everyday life. Such are *to operate* for to work, *to locate* for to place, *to eventuate* for to turn out, *to donate* for to give, *to opine* for to think, *to approbate* and *captivate* for to approve and capture; *tardy* in the sense of late for school; *caption,* a heading or title; *institution, lyceum,* or *academy* for school or college; *recitation* for lesson, *proclivities* for tastes, *eminence* for hill, *residence* for house, *elegant* for pretty, *vacation* for holidays, and *prominent citizens* for well-known men. In like manner *to ambition* is used for to aim at, *to suspicion* for to suspect.

Among Americanisms most familiar or most noticeable to Englishmen may be mentioned: *any* for at all; *aside from* for apart from; *back of* for behind; *bug* for any insect—e.g. *lightning bugs,* fireflies; *to boost,* push or boom; *block,* a square of buildings; *candy,* sweetmeats; *conductor,* guard of a train—introduced about 1880 into England, according to Mr R. H. Thornton (who himself falls into an Americanism) by the 'Midland *Railroad*;' *corn* for Indian corn; *cracker,* biscuit; *cute,* shrewd; *fall,* autumn; *to favor,* to look like; a *fish story,* cock-and-bull story; *fool,* foolish; *a half after ten,* half-past ten; *lot,* piece of land; *most* for almost; *none* or *nohow,* not at all; *plenty,* plentiful; *sidewalk,* pavement; *slick,* smoothly, quickly; *some,* somewhat, remarkable.

Many Americanisms may be classed as: (*a*) words indicating things distinctively American; (*b*) nicknames for persons and places; or (*c*) expressions invented or adopted to describe phenomena of American life, political, financial, social, &c. Examples of (*a*) are: *backwoods, buckeye* (American horse-chestnut), *cocktail, cow-catcher, doughnuts, hangbird, homing, huckleberry, locust* (pseudo-Acacia), *opossum, peanut, persimmon, popcorn, ragtime.* (*b*) *Old Hickory,* Andrew Jackson; *Greaser,* Mexican; *Keystone State,* Pennsylvania; *Monumental City,* Baltimore; *Bluenose,* a native of Nova Scotia or New Brunswick. (*c*) *To bolt a nomination* or *to rat,* to desert one's party; on the *stump, electioneering, gerrymandering, lobbying, log-rolling; caucus, graft, machine, platform, plank, ticket* in political parlance; *bogus, bucket-shop, slump, wildcat* schemes; *dago, crook, dude, hobo, hoodlum,* and many other derogatory terms.

Among obsolete English forms current in America may be quoted *gotten* (got), *dove* (dived), *her'n* and *his'n* (hers and his), *happen* (to be) *in* (a place). The tendency to take our slang in particular from American sources is largely on the increase, and has been strengthened partly by the diffusion of works like Mark Twain's and Frank Stockton's, partly by the increased intercourse between the two countries, and partly by the influence of the cosmopolitan Americans who throng the Continent.

In the New England states the Americanisms in use are chiefly those of the older crop—that is to say, the English words now obsolete or provincial, and the words evolved on the soil for new objects or recent inventions. In the south, among the white population, almost pure English is generally spoken. But in the middle states, and still more in the west, slang is rife, and startling Americanisms form the mass of the colloquial language. All over America, including Canada, the spoken tongue tends to be far less correct than the written. People who write *is not,* say *ain't;* people who write *almost always,* say *most allus;* people who write *very ordinary,* say *pretty or'nery.*

Americanisms in spelling are chiefly due to the influence of Noah Webster's dictionary, which in many cases adopts an orthography not sanctioned by British authorities, as practiced, offenses, labor, theater, traveler, traveled, mold, fulfillment.

See *The English Language in America* (Cambridge Essays, 1855); Bartlett's *Dictionary of Americanisms* (1858); Lowell's prefaces to *Biglow Papers;* Farmer, *Americanisms Old and New* (1889); Brander Matthews, *Parts of Speech* (1901); R. H. Thornton, *An American Glossary* (1912); Mencken, *The American Language* (1922).

American Organ. See HARMONIUM.

Amer'igo Vespucci. See VESPUCCI.

Amerongen, a Netherlands village, 21 m. SE. of Utrecht. Count Bentinck's castle became the retreat of the deposed Kaiser William II.

Amersfoort, an ancient town of the Netherlands, 14 miles NE. of Utrecht by rail. It has a large trade in grain; tobacco is grown in the district; brandy, cotton, linen, and woollen goods, leather, soap, and beer, are manufactured. Here was Oldenbarneveld born. Pop. 31,000.

Amesbury, a village of Wilts, 7½ m. N. of Salisbury, the traditional place of Queen Guinevere's retirement and penance—an example long fashionable for great ladies. The name (O.E. *Ambresbyrig*) perhaps connects it with Ambrosius Aurelianus, leader of the Britons against the English invaders. Stonehenge (q.v.) and a great British camp are close by. See COURSING.

Am'ethyst, a variety of Quartz (q.v.), differing from common quartz and rock-crystal chiefly in its beautiful violet-blue or purplish-violet colour—well known as *amethystine*—which is owing to the presence of a little peroxide of iron or of manganese. It is one of the most esteemed varieties of quartz, and is much employed for seals, rings, &c., although, being comparatively abundant, it is much inferior in price to the true gems. An amethystine tinge is frequently to be observed in specimens of quartz, which yet are not perfect amethyst. The tinge is often very faint, and is frequently confined to the summits or edges of the crystals. The finest specimens of amethyst are brought from India, Ceylon, and Brazil. It is, however, a common mineral in Europe, and occurs in many parts of Scotland. It frequently occurs lining the interior of balls or geodes of agate, and in veins and cavities in basalt, diabase, and other igneous rocks. The ancients imagined it to possess the property of preventing intoxication, and persons much addicted to drinking therefore wore it on their necks. The name is derived from a Greek word which signifies *unin-*

toxicated.—Not to be confounded with this mineral is that sometimes called the *oriental amethyst*, which is a purple variety of Corundum (q.v.), and is a very valuable gem. False amethysts made of glass or *paste* are common, and in general coarse; but a very perfect imitation is sometimes made.

Amha'ra ('the high lands'), the largest of the three older divisions of Abyssinia, extending from the Tacazzé to the Blue Nile, and embracing the beautiful Lake Tzana (see ABYSSINIA). Capital, Gondar (q.v.). The *Amharic language* is spoken, with local variations, throughout Abyssinia, and has, except in Tigré, entirely superseded the Ethiopic, or Geez, to which it is related (see ETHIOPIA, SEMITIC LANGUAGES). Like the latter, it is of Semitic origin, but has been largely corrupted with non-Semitic African admixtures.

Amherst, a seaport of Tenasserim, Burma, at the mouth of the Salwin, 30 miles S. of Maulmain. Founded in 1826 as the capital of the province, it was superseded next year by Maulmain, and is now of no importance.

Amherst, a seaport of Nova Scotia, on Cumberland Basin, an inlet of the Bay of Fundy; pop. 10,000.

Amherst, a village in Massachusetts, 20 miles N. of Springfield, seat of Amherst College (founded 1821) and a state agricultural college; pop. 5000.

Amherst, JEFFREY, Baron Amherst (1717–97), born at Riverhead, Kent, as a boy was a page to the Duke of Dorset, who in 1731 procured him an ensigncy in the Guards. In 1758 Pitt gave him the command of the expedition against the French in Canada; and Canada was ours by the autumn of 1760, thanks to his prudence and to Wolfe's enthusiasm. This was the great achievement of his life, though in 1772 he became officiating commander-in-chief, and in 1796 a field-marshal, having been raised to the peerage in 1776. He died at Montreal, his Kentish seat. See Life by L. S. Mayo (1916).—His nephew, WILLIAM PITT AMHERST, Earl Amherst of Arrakan, was born in 1773, and succeeded as second baron in 1797. His embassy to China (1816) failed through his manly refusal to 'kotow' to the emperor; but, in spite of that failure, he received in 1823 the governor-generalship of India. For the successful first Burmese war, and for the capture of Bhurtpore, he was rewarded with an earldom in 1826. Two years later he returned to England, and, after nearly thirty years of comparative retirement, died at Knole Park, Kent, 13th March 1857.

Amherstburg, a town of Ontario, Canada, at the head of Lake Erie, 4 miles S. of Detroit. It has a large timber trade. Pop. 2800

Amianthus. See ASBESTOS, AMPHIBOLE.

Amice, a cape or hood formerly worn by priests and pilgrims. Also, a strip of fine linen, with a piece of embroidered cloth sewn upon it, worn upon the shoulders by priests of the Roman Catholic Church in the service of the Mass. The bands sometimes worn by Protestant clergymen are a relic of this garment.

Amides was the name originally applied to a group of organic compounds, derived from ammonia, NH_3, or NHHH, by the exchange of one or more atoms of hydrogen for a corresponding number of atoms of a metal or a compound radical. At present the term *amide* is restricted to the case in which one or more atoms of hydrogen are replaced by an *acid* radical, and the amides are called primary, secondary, or tertiary, according as one, two, or all three of the atoms of hydrogen are replaced. The primary amides may be obtained in various ways, of which we shall mention two: (1) If we heat an ammoniacal salt, one molecule of water is given off, and an amide is obtained:

$$CH_3{\cdot}COONH_4 = CH_3{\cdot}CONH_2 + H_2O$$
(ammonium acetate) (acetamide) (water).

(2) By treating an acetyl chloride with ammonia gas, the acetyl group is substituted for one atom of the hydrogen of ammonia:

$$CH_3{\cdot}COCl + 2NH_3 = CH_3{\cdot}CO{\cdot}NH_2 + NH_4Cl$$
(acetyl chloride) (ammonia) (acetamide) (ammonium chloride).

The amides can, for the most part, be obtained in a crystalline form, and are fusible volatile bodies. If, in place of an *acid radical*, a *base radical* replaces one or more atoms of hydrogen in ammonia, a class of compounds termed *Amines* (q.v.) is formed.

Amiel, HENRI FRÉDÉRIC (1821–81), was born at Geneva. After travelling in Italy, he studied at Berlin (1844–48), returned to Geneva saturated with German science and philosophy, and in 1849 became professor of Æsthetics and French Literature; which chair, four years later, he exchanged for that of Moral Philosophy. His wide culture, critical power, and profound but melancholy speculation were revealed to the outside world by a selection published after his death from his *Journal Intime* (2 vols. 1882–84; Eng. trans. 1885). He also wrote poetry. See Berthe Vadier's *Henri Amiel* (1885), and G. Frommel's *Études littéraires et morales* (1909).

Amiens (ancient *Samarobriva*), an old French city, the capital once of Picardy, and now of the department of Somme, on the many-channelled, navigable Somme, 81 miles N. of Paris by rail. Its fortifications have been turned into boulevards, but it retains its old citadel. The cathedral of

Amiens Cathedral.

Notre Dame, begun in 1220, is 452 feet long, and has a spire (1529) 426 feet high; but its special feature is the loftiness of the nave, 141 feet. It survived the great European war intact. In *The Bible of Amiens*, Ruskin says this church well deserves the name given it by Viollet-le-Duc, 'the Parthenon of Gothic architecture,' and that its style is 'Gothic pure, authoritative, and unaccusable.' Other noteworthy buildings are the Hôtel-de-Ville (1600–1760), in which the Peace of Amiens was signed; the large museum (1864) in Renaissance style; and the public library (1791). Amiens

has considerable manufactures of velvet, silk, woollen, and cotton goods, ribbons, and carpets. Peter the Hermit and Ducange were natives, and have statues. The 'Mise of Amiens' was the award pronounced by Louis IX. of France, in 1264, on the controversy between Henry III. of England and his people as to the 'Provisions of Oxford.' The 'Peace of Amiens' (March 27, 1802) was a treaty intended to settle the disputed points between England, France, Spain, and Holland. By it England retained possession of Ceylon and Trinidad, and an open port at the Cape of Good Hope; the republic of the Ionian Islands was recognised; Malta was restored to the Knights of St John; Spain and Holland regained their colonies, with the exception of Trinidad and Ceylon; the French were to quit Rome and Naples; and Turkey was restored to its integrity. In 1870 Manteuffel signally defeated the French near Amiens, and three days later the citadel surrendered. The Germans took Amiens in September 1914. Pop. 93,000.

Amines, a class of organic compounds derived from ammonia (NH_3) by replacing the hydrogen atoms by univalent groups—alkyls (or alcohol radicals). They are classified as primary, secondary, or tertiary, according as one, two, or three atoms are replaced. The outstanding univalent groups may also be those of the aromatic series—e.g. phenylamine, $C_6H_5NH_2$, better known as aniline. The alkylamines (amines of the fatty series) are very similar to ammonia in their properties. The lower members are gases, combustible (being thus distinguished from ammonia), and readily soluble in water. The higher members are liquids, soluble in water; whilst the highest are solids, sparingly soluble in water. The amines, like ammonia, combine with acids to form salts, which differ from ammoniacal salts by being soluble in alcohol. Methylamine (CH_3NH_2), the simplest primary amine, is found in bone-oil, in the distillate from wood, and is produced in the decomposition of various natural alkaloids—e.g. morphine, creatine. Trimethylamine ($(CH_3)_3N$—a tertiary amine—has a penetrating fishy odour, is present in herring-brine, and is a by-product in beet-sugar manufacture.

Amirante Islands, a group of eleven low wooded islands SW. of the Seychelles; area, 32 sq. m.; pop. 100 French-speaking half-breeds. They fell to Great Britain in 1814, and in 1888 were attached to the Seychelles administration.

Amlwch, a small seaport and watering-place, since 1901 an urban district, on the north coast of Anglesey, 21½ miles NNW. of the Menai Bridge by rail. The closing of the copper-mines on Parys Mountain (2 miles to S.) greatly reduced the prosperity and population of the district. These mines were probably known to the Romans. A rich vein of ore was struck in 1768. Pop. 2700.

Amman. See KERAK.

Ammana'ti, BARTOLOMMEO, architect and sculptor, was born at Florence in 1511, and died in 1592. He was a pupil of Bandinelli and Sansovino. Pope Julius III. employed him in the decoration of the Capitol, and Cosmo de' Medici appointed him his architect. His works have all a certain grandeur of character, but are marred by mannerisms.

Ammergau. See OBER-AMMERGAU, MYSTERIES AND MIRACLE PLAYS.

Ammia'nus Marcelli'nus, a Roman historian, born of Greek parents at Antioch in Syria, about 330. After serving in several campaigns in Gaul, Germany, and the East, he settled at Rome, devoted himself to literature, and was alive as late as 390. He wrote in Latin a history of the Roman empire from 96 to 378 A.D., in 31 books, of which only 18 books are extant, comprising the years 353 to 378. This part of the work, however, is the most valuable, being a highly important contemporary source for the history of the Emperor Julian. The work may be regarded as a continuation of Tacitus, and though the portions remaining have many faults of style, they are valuable on account of the author's careful descriptions of countries and events from personal observation.

Ammon. See KERAK.

Ammon, a god of the ancient Egyptians, worshipped especially in Thebes (*No-Ammon*), and early represented as a ram with downward branching horns, the symbols of power; as a man with a ram's head; and as a complete man with two high feathers on his head, bearded, sitting on a throne, and holding in his right hand the sceptre of the gods, in his left the handled cross, the symbol of divine life. Ammon, his wife Mut ('the mother'), and his son Chensu, form the divine triad of Thebes: their worship was at its greatest height under the 18th to the 20th dynasty. The name signifies the hidden, unrevealed deity; and in Egyptian mythology he held the highest place. His undefined character may serve to explain how other deities were identified with Ammon. After the 18th dynasty we find in hieroglyphics the name *Amun-Ra* frequently inscribed, indicating a blending of Ammon with the sun-god Ra. Similarly, the representation of Ammon with a ram's head shows the blending of him with Kneph. From about the time of the 21st dynasty, he came to be considered the god of oracles, and as such was worshipped in Ethiopia and in the Libyan Desert. Twelve days' journey west of Memphis, in the desert was a green oasis fringed with a belt of palm trees, on which rose the temple of Ammon. Hither came pilgrims laden with costly presents; among them Alexander the Great and Cato of Utica. Alexander was hailed as the actual son of the god by the priests, quick to anticipate the wishes of the hero. The Persian conqueror Cambyses sent against the temple an expedition, which perished miserably in the sands. The worship of Ammon spread at an early period to Greece, and afterwards to Rome, where he was identified with Zeus and Jupiter.

Ammon, CHRISTOPH FRIEDRICH VON, a German theologian, born in 1766, was professor of theology at Erlangen and Göttingen, and court-preacher at Dresden, where he died in 1850. He wrote handbooks of biblical theology, church history, and Christian ethics. He may be said to have stood midway between supranaturalism and rationalism.

Ammonia, HARTSHORN, or the VOLATILE ALKALI, was one of the few substances known to the chemistry of the ancients; being referred to by Pliny under the name of *vehement odour*, which he evolved by mixing lime with nitrum (probably sal ammoniac). It derives its name ammonia from its being obtained from sal ammoniac, which was first procured by heating camels' dung in Libya, near the temple of Jupiter Ammon. The atmosphere contains a minute quantity of ammonia, amounting to 210 to 247 parts in 10,000,000,000 parts of air, which is equal to 1 volume of ammonia in 28,000,000 of air. It is likewise present in rain-water in variable proportion. The supply of ammonia to the atmosphere is due to its evolution during the putrefaction of animal and vegetable substances, during the vinous fermentation, and the combustion of coal. It is likewise present in respired air, and is therefore a product of the daily wear and tear of the animal system. The commercial source of ammonia at the present time is the destructive distillation of coal, as in gas-making, when it is got as a by-product. The mixed gases from the furnaces pass through water in which the tarry matter is collected, and

a large proportion of ammonia dissolves. This solution is known as 'ammoniacal liquor.' This is heated with slaked lime, and the gas evolved is caught in dilute acid (either hydrochloric or sulphuric) and forms either ammonium chloride or sulphate. The ammonium chloride is known commercially as 'sal-ammoniac,' and is purified by sublimation.¶ Pure ammonia is manufactured from this impure chloride of ammonium by mixing it with its own weight of slaked lime in a retort, and applying a gentle heat, when the ammonia as a gas passes over, and is received in a vessel containing water. The solubility of ammonia in water is very great, 1 volume of water at 32° F. (0° C.) dissolving 1050 volumes of ammoniacal gas.

The *liquor ammoniæ* of the chemists, or *hartshorn* of the shops, contains about 32 per cent. by weight of the gas, and it is lighter than water, its density being ·891. The solution of ammonia is transparent, colourless, and strongly alkaline. In taste it is acrid caustic, and in odour very pungent. Applied to the skin in a concentrated form, it blisters. As generally obtained, it is in combination with water, and may be represented by the formula NH_4HO. Dry ammonia can be procured by passing the vapour of ammonia, as ordinarily obtained, over fused chloride of calcium, when the water is abstracted, and true gaseous ammonia is left, having the composition of one atom of nitrogen and three of hydrogen, NH_3. Gaseous ammonia can be liquefied under pressure and cold, and then yields a colourless, clear, mobile liquid. Liquid ammonia was one of the first substances used for refrigerating purposes. The ammonia gas is liquefied by pressure, being kept cool by a water-jacket. The liquid then passes into pipes surrounded with brine, and is allowed to evaporate. The brine cooled thereby is circulated through the refrigerating chambers, and returns to be cooled again by the evaporation of the liquid ammonia as before. Ammonia combines with acids to form a class of salts which are of considerable importance. Thus, the crystallised sulphate of ammonia, $(NH_4)_2SO_4$, is very extensively used as a top-dressing by farmers, and is also mixed with manures where an increase of ammoniacal matter is desirable. The chloride of ammonium is also employed in agriculture; likewise largely by the Russian peasantry, in place of common salt, as a condiment for food. See MINDERERUS SPIRIT.

In medicine, the gaseous ammonia has been rarely used. The solution of ammonia is employed as a means of rousing the respiratory and vascular systems; and of the speedy alleviation of spasm. It is also used as a local irritant and antacid. It is serviceable in dyspeptic complaints with preternatural acidity of stomach and flatulence; to produce local irritation or destruction of certain parts, and to render comparatively harmless the bites of poisonous animals, such as serpents and insects.

Ammonium is the term applied to the group of atoms represented by the formula NH_4. As this group enters into the composition of many salts, exactly in the same way that potassium, sodium, and other metals do, the term *hypothetical metal* has been applied to it, although no one has ever succeeded in isolating it. Ammonium may be prepared by acting on an amalgam of sodium and mercury with a solution of chloride of ammonium. A portion of mercury is slightly heated in a porcelain vessel, and pieces of sodium introduced, when the sodium and mercury combine, and form an amalgam of sodium and mercury, which is a semi-solid substance, and scarcely occupies more space than the bulk of the mercury employed. If this be introduced into a vessel containing a strong or saturated solution of chloride of ammonium, NH_4Cl, the chlorine combines with the sodium, Na, of the amalgam, forming chloride of sodium, NaCl, and the ammonium unites with the mercury, forming the amalgam of ammonium and mercury. As the change referred to proceeds, the amalgam increases in size many times, and forms a spongy mass of the consistence of butter, which rises through the saline solution and floats on the surface. The amalgam of ammonium and mercury very readily decomposes, and hence the difficulty of determining its exact composition.

Ammoni'acum, or AMMO'NIAC, a gum resin, used in medicine on account of its stimulant and expectorant qualities, is obtained from *Dorema Ammoniacum*, a plant of the natural order Umbelliferæ, a native of Persia—a perennial about seven feet high, with large doubly pinnate leaves. The leaves are about two feet long. The whole plant is abundantly pervaded by a milky juice, which oozes out upon the slightest puncture, and which hardens, and becomes ammoniacum. The ammoniacum exudes from punctures made by a beetle, which appears in great numbers at the time when the plant has attained perfection. It occurs in commerce either in tears, or in masses formed of them, but mixed with impurities. It is whitish, becoming yellow by exposure to the atmosphere, is softened by the heat of the hand, and has a peculiar heavy unpleasant smell, and a nauseous taste, at first mucilaginous and bitter, afterwards acrid. It is not fusible, but burns with white crepitating flame, little smoke, and strong smell.

Ammoniaphone, an apparatus designed by Moffat (1880) to improve the human voice by the inhaling of air saturated with peroxide of hydrogen and free ammonia. For a time the invention found favour with singers and speakers.

Ammonite is the name of one of the 'high explosives,' which comprise also Ardeer powder, bellite, carbonite, roburite, and securite. See BLASTING, DYNAMITE, EXPLOSIVES, GUN-COTTON, NITRO-GLYCERINE, PICRIC ACID.

Ammonites, a Semitic race of people, living on the edge of the Syrian Desert; according to Gen. xix. 38, the descendants of Lot, and closely akin to the Moabites. They inhabited the country lying to the north of Moab, between the rivers Arnon and Jabbok. Their chief city was Rabbath-Ammon. The Israelites were often at war with them. Jephthah defeated them with great slaughter, and they were also overcome by Saul, David, Uzziah, and Jotham; but after the fall of the kingdom of Israel (721 B.C.), they spread themselves in the districts east of the Jordan. They sometimes secured the alliance of Syria, of Nebuchadnezzar, and of Arabian tribes, in their wars with the Jews. After the captivity, they endeavoured to hinder the restoration of the Jewish state, but were finally conquered by Judas Maccabæus. Justin Martyr affirms that in his time the Ammonites were still numerous. From the name of their princes, it is evident that their language was closely akin to Hebrew. Their chief deity was Moloch, and under that head their religion is discussed.

Ammonites, a group of fossil shells, nearly allied to the recent genus Nautilus, being, like it, chambered and spiral. The molluscous inhabitant appears to have lodged in the last and largest chamber of the shell, the spaces left behind as it increased in size being successively converted into air-chambers, and all connected by a tube (*siphuncle*), so that the animal could at pleasure ascend or descend in the sea; whilst the transverse plates dividing the chambers gave strength to the whole structure without great increase of weight. In the Nautilus these dividing plates (*septa*) are simple and curved, and their edges (*sutures*) plain; but in the Ammonites the septa are often very

complex, and the sutures zigzagged, foliated, or irregularly lobed. Ammonites have long been popularly called *Cornua Ammonis*, from a fancied resemblance to the horns on the sculptured heads of Jupiter Ammon. In former times they were ignorantly mistaken for petrified snakes; and impositions have been practised on collectors by adding to specimens nicely carved snakes' heads; whilst the general absence of heads was popularly accounted for by a legend of a saint decapitating the snakes, and turning them into stone. The family to which the Ammonites belong (Ammonoidea) ranged from Palæozoic to Mesozoic times, and embraced a number of different forms. In some the shell is straight (Bactrites, Baculites); others are bent on themselves (Ptychoceras); some are curved (Toxoceras); then we have an elegant

Ammonites:

1, *Ammonites obtusus*; 2, section of *Ammonites obtusus*, showing the interior chambers and siphuncle; 3, *Ammonites nodosus*.

spiral form (Turrilites); besides discoidal and semi-discoidal forms (Crioceras, Ancyloceras), and involute types such as Ammonites (of which there are many types), Goniatites, Ceratites, &c. The most prominent Palæozoic representatives of the family are Goniatites and Clymenia. The Ammonites proper are Mesozoic forms, and are characteristic of the Jurassic and Cretaceous systems. In the former system especially, particular species distinguish particular zones, which renders the group of great interest and importance to the geologist; for some of these zones are persistent over wide regions. The number of species of true Ammonites is very great, several hundreds being known. They differ much in size, some being quite minute, while others are as large as cart-wheels.

Ammo'nium, the site of the famous temple of Ammon in the Libyan Desert, the modern oasis of Siwah. See AMMON, OASES; see also AMMONIA.

Ammo'nius, surnamed SACCAS ('sack-carrier'), a Greek philosopher, founder of the Neo-Platonic School, is said to have been in his earlier days a porter in Alexandria, whence his surname. His parents were Christian, but he himself is said by Plotinus to have abandoned his early religion; although both Eusebius and St Jerome deny his apostasy. He opened a school of philosophy in Alexandria, and sought to harmonise, through a comprehensive eclecticism, the philosophies of Aristotle and Plato. He seems also to have added elements of oriental speculation; but it is doubtful how far Neo-Platonism represents his own position. His most distinguished pupils were Origen and Plotinus. Ammonius Saccas died at Alexandria, 243 A.D., at the age of more than eighty. He left no writings behind him.

AMMONIUS was also the name of a Peripatetic philosopher of the 1st century, the instructor of Plutarch; of a Christian philosopher of the 3d century, who wrote a 'Harmony of the Gospels;' of a philosopher of the 5th century, a disciple of Proclus, who left important commentaries on Aristotle; and of an Alexandrian grammarian of the 4th century.

Ammophila. See REED.

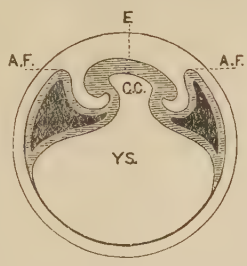
Ammunition is a term once used for all military stores; now only for materials employed in charging firearms. Ammunition wagons are specially constructed for carrying different kinds of ammunition. See the articles BULLET, CANNON, FIREARMS, FUSE, GUN, GUNNER, GUNPOWDER, RIFLES, SHOT, SHELL, TORPEDO, and the like.

Amne'sia is loss of memory. See MEMORY.

Amnesty (from Greek words for 'not remembered') signifies an act of pardon or oblivion, and the effect of it is, that the crimes and offences against the state, specified in the act, are so obliterated that they can never again be charged against the guilty parties. While pardon exempts individuals from the punishment the law inflicts for their offence, an amnesty is generally granted to a whole class of offenders. The word is also applied to clauses in a treaty of peace which grant immunity from civil or criminal processes to which persons might be otherwise exposed in consequence of their conduct in the war. The amnesty may be either absolute, or qualified with exceptions. Bonaparte, on his return from Elba in 1815, declared an amnesty, from the benefits of which he excepted thirteen persons whom he named. Upon the restoration of Charles II., the persons actually concerned in his father's execution were, as a class, excluded from the amnesty granted. It is of importance that exceptions should be specific, and not, as in the Bourbon Amnesty of 1816, of a general kind, so as to leave doubt and uncertainty in the public mind. The amnesty to all who were guilty of treason against the United States, or adhered to their enemies during the Civil War, included domiciled aliens. But the proclamation (1868) did not entitle one whose property had been sold under the Confiscation Act of 1862 to reclaim the proceeds after they had been paid into the treasury of the United States. The French pardoned 2245 Communards by decree in 1879, and granted a general amnesty for political offences in 1880.

Amnias, or AMNEUS, a river of Pontus, on which the generals of Mithradates (q.v.) defeated the Bithynians, 88 B.C.

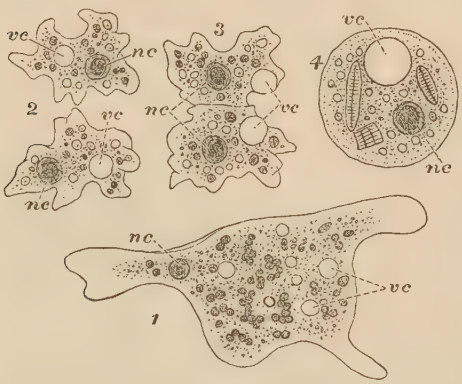
Amnion is a fœtal membrane which immediately invests the embryo, appearing very early in the development of the latter, and adhering closely to it. Double folds grow round the embryo, arching over it on all sides, and uniting in a central point. The origin of the anterior and posterior folds is indicated in the diagram (A.F.) The inner layer of this double fold becomes separate from the outer and forms the amnion, while the outer portion forms the chorion, which when vascularised by the vessels of the embryo takes its place as the fœtal part of the placenta. In fishes and amphibians it does not exist, but is found in reptiles, birds, and mammals. As gestation proceeds, this membrane secretes from its inner surface a fluid which distends the amnion, within which the fœtus floats suspended by its umbilical cord. That this fluid, the *liquor amnii*, is of fœtal origin, is shown by its occurrence in



A.F., amnion-fold; E., embryo; G.C., gut-cavity; Y.S., yolk-sac. (After Weidersheim.)

birds. It consists of water, containing epithelium, hairs, and ½ to 2 per cent. of fixed solids. In mammals, the fœtal urine is added to it during the second half of pregnancy. Its specific gravity varies from 1007 to 1011. The fluid preserves the fœtus from injury and pressure, permits of the free movement of its limbs, and prevents them from growing together. When gestation is completed, and labour commences, the amniotic fluid is the chief mechanical agent in dilating the os uteri, and so opening the way for the fœtus. See EMBRYO; and for many curious superstitions connected with the subject, see CAUL.

Amœba (Gr., 'change'), a name given to a number of the simplest animals or Protozoa (q.v.), which consist of unit masses of living matter (see CELL, and PROTOPLASM). They are found in fresh water or in mud, and occasionally in damp earth (*A. terricola*). One of the commonest was first described in 1755 by an early microscopist, Rösel von Rosenhof, and the name he gave it—*Proteus animalcule*—still survives in popular language. They are all minute, but some are distinctly visible with the unaided eye. The naked mass of living matter or protoplasm flows out in all directions in blunt processes (*pseudopodia* = 'false feet'), and the endlessly varying form has earned for these simple animals their technical and popular names of



Amœba:

1, amœba with blunt processes, nucleus, *nc*; contractile vacuoles, *vc*; food vacuoles and granules. 2, two daughter amœbæ. 3, amœba in process of dividing. 4, encysted phase, with inclosed diatoms, &c. (After Bütschli and G. B. Howes.)

amœba and *Proteus animalcule*. Many unit masses or cells of higher animals—e.g. the white corpuscles of the blood—exhibit the same ceaseless change of form, which is generally described as *amœboid*. The outer layer of the protoplasm is usually firmer than the interior, and in reference to this physical difference the terms *ectosarc* and *endosarc* are often used. The central portion contains the more refractive body or nucleus, which is so characteristic of all cells, and which evidently plays an important part in the life of the animal. More than one nucleus is often present. The amœba flows along the surface of stone or plant by the slow protrusion of the ever-changing processes. In this way, too, it flows over, and gets outside particles of food, such as diatoms, which are engulfed in the protoplasm, and form with the little bubble of water surrounding them what are known as *food-vacuoles*. The available material, which may be either vegetable or animal, is slowly digested, and the refuse expelled. As the result of internal changes, granules and globules of various kinds appear in the protoplasm. Two pulsating bubbles or *contractile vacuoles* are usually to be seen, which doubtless secure to some extent the aeration and purification of the protoplasm. In unfavourable circumstances, the amœba can save its life by sweating off a sheath or *cyst*, within which it waits passively for better times. This passage from an active to an encysted phase is exceedingly common among the Protozoa. On attaining its maximum size, the amœba draws itself out, and breaks into two daughter amœbæ, each of which contains half of the mother nucleus. In a closely allied giant amœba, *Pelomyxa*, a number of spore-like young are formed within the parent, and in other cases some of the processes are nipped off as buds. Two amœbæ sometimes flow together and fuse in a manner which may be fairly regarded as an incipient form of sexual union (see CONJUGATION, SEX). This simple organism thus exhibits within small compass all the usual animal functions. It is contractile, irritable, and automatic; it feeds, assimilates, secretes, grows, and reproduces; and the intimate changes within the unit mass of protoplasm, in which there is no division of labour, must therefore be exceedingly complex (see PHYSIOLOGY, PROTOPLASM). There are several species of amœba and numerous related forms, which differ in the formation of an external shell, and in similar unessential characters. All amœboid forms with *blunt* processes are ranked together in the sub-class Lobosa, and are often included under the more general title of Rhizopoda, which comprises all the Protozoa that are predominantly amœboid. *A. villosa* has a rough tuft at one end; *Lithamœba* is large and disk-shaped; *Pelomyxa* may attain a diameter of one-sixteenth of an inch, and a number may be artificially united into a much larger mass; *Arcella* has a somewhat horny shell, and the power of floating itself by means of secreted gas bubbles, as has been also observed in an amœba; *Difflugia* has a membranous shell stuck over with sand grains and other foreign particles. Amœbæ are to be found by allowing mud and débris from ponds to settle, and then examining patiently under the microscope.

See Leidy, *Fresh-water Rhizopods of North America* (1879), Bronn's *Protozoa*, Bütschli's *Protozoa* in Bronn's *Thierreich*, and Ray Lankester's *Zoology* (1900-3).

Amœbean Verses are such as answer one another alternately, as in some of Virgil's eclogues.

Amok. See MALAYS.

Amol, a town of Persia, 76 miles NE. of Teheran, on the Heraz, a river which flows into the Caspian; pop. 10,000.

Amo'mum, a genus of Zingiberaceæ. See CARDAMOMS and GRAINS OF PARADISE.

Am'orites, a powerful tribe whose territory used to be defined as the country north-east of the Jordan, as far as Mount Hermon, now known from Babylonian sources to have occupied most of the habitable tracts from Mesopotamia to Lebanon. In the 14th century B.C. they passed from dependence on Egypt to vassalage under the Hittites (q.v.). In the 13th century B.C. a section of them defeated the Moabites, crossed the Jordan, and overran Canaan to the sea; but their power was broken by the Hebrews under Joshua at Gibeon. Sihon, king of Heshbon, and Og, king of Bashan (the last said to have been of gigantic size), are spoken of in Scripture as Amorite princes. The victory of Joshua did not exterminate the Amorites in Canaan; a residue became tributary under Solomon. Some recent scholars have held that they were in race akin to the Hittites, others that they were of Aryan stock; the accepted opinion of late is that they were certainly Aramæans.

Amorphous (Gr. *a-*, 'not,' *morphē*, 'form'), shapeless. In Chemistry, the term amorphous is

used to describe the uncrystallised, in opposition to the crystallised, condition of bodies. There are substances which, in certain conditions, are capable of crystallisation, but in other conditions remain amorphous. Thus, pure sugar contains carbon, which appears as an amorphous substance after the sugar has been burned in a platinum crucible. The same substance, carbon, appears in its crystallised form in the diamond.

Amory, THOMAS, an eccentric author of Irish descent, who was born about 1691 and died in 1788. His father was Councillor Amory, who went with William III. to Ireland, and was made secretary of the forfeited estates. Amory speaks of having lived in Dublin, where he knew Swift, whose sermon on the Trinity he calls in a public letter to Lord Orrery a 'senseless and despicable performance.' He was living in Westminster about 1757, with a country retreat at Hounslow. Amory lived a retired and meditative life, seldom going abroad save after dark. His *John Buncle* is a curious medley of religious and sentimental rhapsodies, descriptions of scenery, and fragments of autobiography. Latterly, his intellect is believed to have been disordered. Amory's chief works are: *Lives of Several Ladies of Great Britain: A History of Antiquities, Productions of Nature,* &c. (1755); and the *Life of John Buncle* (1756–66).

Amos, one of the so-called minor prophets of the Hebrews, was a herdsman of Tekoa, in the neighbourhood of Bethlehem, and also a dresser of sycamore trees. During the reigns of Uzziah in Judah, and Jeroboam II. in Israel (about 800 B.C.), he came forward to denounce the idolatry then prevalent. His prophetical writings contain, in the first six chapters, denunciations of the Divine displeasure against several states, particularly that of Israel, on account of the worship of idols. The three remaining chapters contain his symbolical visions of the approaching overthrow of the kingdom of Israel, and lastly, a promise of restoration. His style, remarkable for its clearness and picturesque vigour, abounds with images taken from rural and pastoral life.

Amoy', a seaport of China, in a small island of the same name (24° 40′ N., 118° E.), in the province of Fukien, 30 miles E. of Chang-chow, 325 miles ENE. of Canton. It is among the most important of the treaty ports, and has been celebrated as a trading town for some centuries. It was one of the earliest seats of European commerce in China, the Portuguese having had establishments there in the 16th, and the Dutch in the 17th, century. In 1841 it was taken by the British, and, by the treaty of Nankin, a British consul and British subjects were permitted to reside there. The trade is now open to all nations. The imports are largely cotton and woollen goods, iron, oil, matches, beans and beancake, rice, flour; the exports include tea, sugar, paper, grass-cloths, and gold-leaf. The value of the imports and exports used to be far greater when the opium and China tea trades were at their height. The country round Amoy is largely depopulated. Pop. 114,000, of whom 300 or 400 are foreigners. The island of Amoy, measuring 9 by 7 miles, has 400,000 inhabitants.

Ampelidaceæ. See VITACEÆ.

Ampelodesmos. See ESPARTO.

Ampelopsis, a genus of the Vitaceæ, closely resembling the vine. The *A. hederacea* is the Virginian Creeper.

Ampère, ANDRÉ MARIE, a distinguished mathematician and physicist, was born at Lyons in 1775. The guillotining of his father in 1793 made a deep and melancholy impression on young Ampère, who sought for solace in the study of nature and antiquity. In 1805, after he had been engaged for four years as a lecturer at Bourg and Lyons, he was called to Paris, where he distinguished himself as an able teacher in the Polytechnic School, having already begun his career as an author by his *Considérations sur la Théorie Mathématique du Jeu* (1802). In 1814 he became a member of the Academy of Sciences; in 1824, professor of Experimental Physics in the Collège de France. He died at Marseilles, June 10, 1836. Scientific progress is largely indebted to Ampère, especially for his electro-dynamic theory and his original views of the identity of electricity and magnetism, as given in his *Recueil d'Observations Électro-dynamiques* (1822), and his *Théorie des Phénomènes Électro-dynamiques* (1830). These researches prepared the way for Faraday's experiments. See his *Journal et Correspondance, 1793–1805* (7th ed. 1877); *André Marie Ampère et Jean Jacques Ampère; Correspondance et Souvenirs* (2 vols. 1875); and St Hilaire's *Philosophie des Deux Ampères* (1866).

Ampère, JEAN JACQUES ANTOINE, son of the preceding, was born at Lyons, August 12, 1800. After laying the groundwork of his comprehensive studies in Paris, he proceeded to Italy, Germany, and Scandinavia. After his return, he lectured on the history of literature at Marseilles; but, after the July revolution (1830), succeeded Andrieux as professor in the Collège de France. He was elected to the Academy in 1847; and died March 27, 1864. Ampère was deeply read in German literature; his learning was marvellously wide, and his valuable writings upon China, Persia, India, Egypt, Nubia, and his Levantine voyages, proved that the far East itself was embraced within the circle of his studies. Many of his magazine articles have been collected under the title *Littérature et Voyages* (1833). His chief works are: *Histoire Littéraire de la France avant le XII^e^. Siècle* (1840); *Histoire de la Littérature Française au Moyen Age* (1841); *Histoire de la Formation de la Langue Française* (1841); *La Grèce, Rome et Dante* (1848); and *La Science et les Lettres en Orient* (1865). Deep research and judicious criticism, expressed in a clear and classical style, distinguish his various compositions.

Ampère, or AMPERE, a unit of electric current, so named in honour of André Marie Ampère (q.v.). It is one-tenth of the electro-magnetic unit of the C.G.S. system, or the current obtained by a difference of potential of one volt with a resistance of one ohm. If A be the value of a current in ampères, R the resistance in ohms, V the difference of potential in volts, then $A = \frac{V}{R}$. For practical purposes it has been defined as 'the unvarying current which, when passed through a solution of nitrate of silver in water, deposits silver at the rate of 0·00111800 of a gramme per second.' See ELECTRICITY, MAGNETISM. An instrument for measuring electric currents is called an Amperemetre, Amperometre, or (contracted) Ammetre.

Ampersand, occurring also in other forms such as AMPUSAND, AMPUSSY AND, is an old name for the symbol (&) employed as a contraction for *and*, which used commonly to be placed at the end of the alphabet. It may be compared with *A per se*, *I per se*, and *O per se*. A child learning to spell or read would name the letters and then the word. For words of one letter he would add in Latin '*per se*' ('by itself'), thus 'A *per se* [spells] *a*,' 'I *per se* [spells] *I*.' The contraction-sign was originally simply the Latin word *et*, as can still be clearly seen in its italic form (*&*). Hence the Scottish name Eppersyand—that is, '*Et, per se, and*.' The other forms indicate that the symbol has come to

be regarded as representing directly not the Latin *et* but the English *and*. *A per se* often meant a thing super-excellent or unique; thus Dunbar: 'London thowe arte of townes A per se;' and Gawin Douglas calls Virgil *A per se*. *O per se O, or a newe Cryer of Lanthorne and Candle Light*, is the title of one of Dekker's works.

Amphibia (Gr., 'double-lived,' as living on both land and water), a class of Vertebrates between fishes and reptiles. The term was used by Linnæus to include reptiles, amphibians, and some fishes, and by Cuvier as synonymous with the title 'reptiles,' which he applied to all animals between fishes and birds. The content of the term was soon narrowed, and the amphibia were separated on the one hand from the reptiles which never breathe by gills, and on the other from the fishes which, with the exception of the Dipnoi, never breathe by lungs. And since the amphibia are more nearly related to fishes than to reptiles, Huxley united them in 1863 with the former in the general division of Ichthyoids, afterwards changed to *Ichthyopsida*, while reptiles and birds were included under the contrasted title of Sauroids or *Sauropsida*.

General Characters.—Typical amphibians, such as newts and frogs, are readily distinguished from the higher vertebrates (reptiles, birds, and mammals) by the possession of gills in larval life (and in some newt-like forms throughout life); by the absence of the fœtal membranes known as Amnion (q.v.) and Allantois (q.v.) (though the latter is represented by the cloacal bladder); by the naked skin (there are dermal scales in Cæcilians) and the general absence of claws (present on three of the toes of the 'clawed toad' Xenopus). There are numerous internal differences of importance. Amphibians are linked to fishes by the Dipnoans, in which the swim-bladder has become a lung and the heart is on the way to become three-chambered; but from the majority of fishes the majority of amphibians are distinguished by the absence of scales, the presence of digits, the absence of fin-rays supporting the median fins if these are present. As regards the two condyles of the skull and the rod or columella which abuts against an opening (fenestra ovalis) into the inner ear, amphibians differ from all fishes. Some other very interesting acquisitions were made by amphibians in the course of evolution; thus they were the first animals to have a movable tongue and vocal chords.

Divisions of the Class.—The amphibia include four orders, three of which are represented by the newt, the frog, and the vermiform Cæcilia; while the fourth includes the Stegocephali (see LABYRINTHODONTS), now wholly extinct. (1) Forms like the newt and salamander, with long smooth bodies and persisting tails, are termed *Urodela* (Gr., 'tail distinct'). The majority are aquatic, but some are thoroughly terrestrial except at the breeding season. They usually have two pairs of limbs, but sometimes only one pair. The larval gills and gill-slits sometimes persist in adult life. Fertilisation is generally internal. All but a few of the hundred or so species are confined to the Northern Hemisphere. There are four families. The Amphiumidæ include the Giant Salamander of Japan (*Cryptobranchus japonicus* or *maximus*), which may be 5 feet long; the 'Hellbender' (*Cryptobranchus* or *Menopoma alleghaniensis*) of the eastern United States, about 18 inches in length; and *Amphiuma means* or *tridactyla* of the south-eastern states, which may attain a length of 3 feet. The Salamandridæ include the Common or Fire Salamander (*Salamandra maculosa*) of the Continent, the newts (*Triton*), the Axolotls (q.v.) (*Amblystoma*) of North and Central America, with one species in Siam. The Proteidæ include the white Olm, *Proteus anguinus*, with hidden eyes, from the subterranean waters of Carniola, and the North American Necturus or Menobranchus. The family Sirenidæ includes a few rather degraded forms, such as *Siren lacertina*, the North American 'mud-eel,' which reaches a length of over 2 feet. Nearly related to the Giant Salamander is a famous Upper Miocene fossil, about a yard in length, which was described by Scheuchzer in 1726 in a dissertation entitled *Homo diluvii testis*. It was believed to be the remains of a man drowned in the deluge, but Cuvier recognised its newt-like characters, and Tschudi named it *Andrias scheuchzeri* in memory of its original describer and his weird fancy. (2) Forms like frogs and toads with four limbs, a short, broad body, without tail, gills, or gill-clefts in adult life, are included in the order *Anura* (Gr., 'without tail'). They have a world-wide representation, except that they are absent from almost all oceanic islands. The vertebral column consists of nine vertebræ and a post-sacral fused rod (*urostyle*). The mouth is wide, with or without a tongue, with teeth on both upper and lower jaws, or on one of them, or absent altogether. Unlike the Urodela, the Anura have large eyes with well-developed lids, and usually a tympanic cavity with a drum. They are more terrestrial than the Urodela, though there are very few exceptions to the rule that there is a prolonged larval or tadpole period spent in the water. There are about nine hundred species, classifiable in a series of families—such as the tongueless Aglossidæ (the South African 'clawed toad,' Xenopus; and the Surinam Toad, Pipa), the tree-frogs or Hylidæ, the toads or Bufonidæ, and the true frogs or Ranidæ. (3) The limbless Cæcilians (Apoda or Gymnophiona) form a small order with representatives in Central and South America, Equatorial Africa, India, and the Malay Archipelago. They are worm-like creatures, without limbs or limb-girdles, with biconcave vertebræ, with the tail very short or absent, with small functionless eyes beneath the skin, and usually with transverse rows of small calcified scales embedded in the dermis. The Cæcilians burrow near the surface of damp soil. Fertilisation is internal, and some forms are viviparous. In some respects the Cæcilians are archaic, and of living amphibians they are the nearest to the extinct Stegocephali. They are peculiar in their skull structure, in their dermic scales, in the large eggs with partial segmentation, and in the absence, so far as is known, of a larval stage breathing by gills. The embryo may show external gills within the egg, but they are lost before hatching. There is one family Cæciliidæ with about sixteen genera, such as Ichthyophis, Hypogeophis, Cæcilia, Gymnophis, and Siphonops. (4) The extinct Stegocephali were salamander-like forms with bony dermal plates on the dorsal surface of the skull, and usually on some other parts as well. They are the earliest known animals with five digits. They appeared in the Lower Carboniferous, and disappeared in the Upper Trias. Some of them have features which suggest reptilian affinities. The skull of Mastodonsaurus was over a yard in length. In many cases (Labyrinthodonts) the ivory of the teeth is folded into a mazy pattern.

Habit of Life.—Modern amphibians are the descendants of those animals which in the course of evolution began to leave the water and possess the dry land. Most of them show in their life-history a recapitulation of this great step, for they have an aquatic juvenile stage; and many of them keep in or near fresh water all their life. There is a characteristic constitutional antipathy to salt, but tadpoles and small frogs have been observed on the seashore at Manila. Many amphibians show a marked capacity for cutaneous respiration, as may be illustrated by the not infrequent occurrence of

individuals without lungs in certain species of newts, and by the hibernating frogs which breathe solely by means of the skin. As cold-blooded or poikilothermous animals, amphibians tend to approximate their body temperature to that of the surrounding world. In tropical heat the evaporation from the moist skin is a useful safeguard. Summer-sleep or æstivation may also set in. Some northern forms hibernate and may show a temperature at freezing-point, yet without succumbing unless the frost be very prolonged and the heart be frozen. The food of the adults is very varied, but usually consists of worms, insects, grubs, slugs, and other small animals. Some of the larval forms are for a time vegetarian, and cannibalism is not uncommon. Though tales of toads within stones are usually based on imperfect observation, there are some authentic instances of prolonged imprisonment in cramped quarters, both in natural and experimental conditions; and there is no doubt that prolonged fasting can be endured. Most amphibians have a very considerable regenerative capacity, being able to repair mutilated limbs or replace lost ones. This is doubtless adaptive to the frequent risk which they run in the natural conditions of their life. Amphibians are very defenceless, but some have a considerable power of colour-change, which may be sometimes useful. The secretion of the skin is sometimes nauseous or poisonous, and this has been shown by experiment to have a protective value in certain cases. In a few cases, such as *Ceratophrys dorsata*, there is a bony shield on the back made up of a number of ossifications of the inner stratum of the dermis and of the subcutaneous connective tissue.

The life of amphibians is, on the whole, at a somewhat low potential, but there is often considerable excitement at the pairing season. The males are sometimes distinguished by brighter colours, dorsal crests, dilatable resonating sacs, and different voice. In the males of a Kamerun frog (*Astylosternus robustus*) there are numerous hair-like filaments on the sides and thighs. In Anura the male embraces the female for hours or even days, and liberates the spermatozoa upon the eggs just as these are expelled. In Urodela the spermatozoa are collected in or on a gelatinous packet or spermatophore, which is formed in the cloaca of the male. The packet is deposited by the male and secured by the cloacal lips of the female. There may be sexual embrace (amplexus) or not, but there is no true copulation except in the limbless Cæcilians. The eggs are usually numerous in Anura, but comparatively moderate in number in the others. There may be three thousand in the Grass Frog (*Rana temporaria*), five thousand in the toad (*Bufo vulgaris*), and ten thousand in the Edible Frog (*R. esculenta*). They have an investment of jelly, and may be laid in strings or singly. Some Urodela and Apoda are viviparous.

Development and Life-history.—The segmentation of the ovum is total and unequal, except in the Cæcilians, where it is partial or meroblastic. In all Anura, and in most of the others, the development takes place outside the body of the mother. As we have noted, there is viviparity in some Urodela and Cæcilians. Thus the Alpine Salamander (*Salamandra atra*) produces two young ones at a time, which undergo their whole metamorphosis before birth. In the majority of cases the young pass through an aquatic larval stage and show various peculiarities specially adapted to this period. There are three external gills on each side, which are formed before the gill-slits open. These are the only gills found in the Urodela, but in the larvæ or tadpoles of Anura a fold of skin (operculum) grows backwards, overlapping the gill-clefts and the gills. Thereafter the gills disappear and their place is taken by a second set, which are called internal, though they are really of the same nature as the first set—branched skin-gills covered with ectoderm. In fact, the gills of amphibians are comparable to the external gills of the Dipnoi and Polypterus, not to the ordinary pharyngeal, endoderm-covered gills of ordinary fishes. In the course of development the gills and gill-clefts disappear, except in a few Urodela (perennibranchiate) in which some of them persist. Among the other larval features may be noticed the adhesive organs, badly called suckers; the lateral line sense-organs like those of a fish (persisting only in perennibranchiate forms); the fish-like circulation; and

The Surinam Toad (*Pipa americana*).

the horny armature of the mouth in the tadpoles of Anura. In a number of cases there is a curious retention of larval characters beyond the normal period. This is known as 'neoteny' (νέος, 'young;' τείνω, 'stretch'), and may be partial, as is sometimes seen in the common frog and toad, or total, as in some newts and the Axolotl, where the permanently larval form becomes sexual. There are many peculiarities in the reproductive habits of amphibians, which may be illustrated by a brief reference to some of the instances of special parental care.

a, segmented ovum of frog, stage with sixty-four cells (from Balfour, after Ecker); *b*, embryo within membrane; *bl*, the blastopore or gastrula mouth (from Balfour, after Remak); *c*, tadpole with external gills (*g*); *m*, mouth; *s*, adhesive organs.

In the Surinam toad (*Pipa americana*) the large ova are placed on the back of the female (the male apparently helping); a little skin pocket is formed around each of them, and thence they are hatched as miniature toads. In Nototrema the female has a dorsal pouch opening backwards, and into this the male pushes the eggs with his hind-legs. In the Nurse-toad (*Alytes obstetricans*) the male winds the strings of ova about his hind-legs, buries himself in damp earth until the time comes for hatching, when he plunges into water and is freed from his living burden. In *Rhinoderma darwinii*, the male takes the large eggs (5–15)

into the resonating sacs, which enlarge as development proceeds, and eventually small frogs escape from the mouth.

Life-history of Frog:

1, recently hatched tadpoles about natural size; 2, with external gills; 2a, same enlarged; 3 and 4, enclosure of gills; 5, hind-limbs visible; 6, after skin-casting, both pairs of legs visible; 7, atrophy of tail; 8, young frog. (From Mivart.)

See Hans Gadow, 'Amphibians and Reptiles,' vol. viii. of *Cambridge Natural History* (1901); G. A. Boulenger, *British Museum Catalogue of the Batrachia* (1882); *Reptiles, Amphibia, &c.*, edited by J. T. Cunningham (1912), section on 'Amphibia,' by Boulenger and Cunningham; Sedgwick, *Student's Textbook of Zoology*, vol. ii. (1905).

Amphibole, the name of a group of minerals which are essentially silicates of lime and magnesia; but these bases are often partly replaced by alumina, and oxides of iron and manganese. The most important minerals in this group are Tremolite, Actinolite, Nephrite (Jade), and Hornblende. Asbestos and its varieties are forms of Tremolite and Actinolite. Many of these occur as fine hair-like filaments, readily separable from each other (*Amianthus*, mountain-flax); in other cases the filaments or fibres are more or less firmly interwoven, giving rise to products which closely resemble the substances after which they are named —mountain-leather, mountain-cork. See separate articles on the minerals named.

Amphictyon'ic Council, a celebrated council of the states of ancient Greece. An *amphictyony* meant originally an association of several tribes for the purpose of protecting some temple common to them all, and for maintaining worship within it, and it was only later that it acquired also a political importance. Its members were called *amphictyons* ('the dwellers around'). Such associations existed at Argos, Delos, and elsewhere; but the most important was that at Anthela, near Thermopylæ, the seat of which was transferred later to Delphi through Dorian influence. The members of this league were twelve in number, and were, according to Æschines, the Thessalians, Bœotians, Dorians, Ionians, Perrhæbians, Magnetes, Locrians, Œtæans, Phthiots, Malians, and Phocians, and the Dolopians who are mentioned in other accounts. The members of this confederation bound themselves by an oath not to destroy any city of the Amphictyons, nor cut off their streams in war or peace, and to employ all their power in punishing those who did so, or those who pillaged the property of the god, or injured his temple at Delphi. So excellent an oath was very indifferently kept. In the primitive period of Greek history it had a beneficial and civilising influence; but its more important interferences in the affairs of Greece were directly contrary to the spirit of its institution. The first of these was the so-called *sacred* war, waged from 595 to 585 B.C., against the Phocian city of Crissa. The second *sacred* war, from 355 to 346 B.C., gave occasion to the fatal interference of Philip of Macedon in the affairs of Greece (see PHILIP); and a third *sacred* war, instigated by Philip, was but the prelude to the victory of Chæronea, so fatal to Greek liberty.

Amphigastria, scales or rudimentary leaves on the under side of a liverwort.

Amphineura are primitive gasteropods. See CHITON, GASTEROPODA, MOLLUSCA.

Amphi'on, son of Zeus and Antiope, brought up with his twin-brother Zethus on Mount Cithæron, where he practised singing to the lyre. When the brothers grew up and discovered their descent, they marched against Thebes, and put to death its king Lycus and his wife Dirce for having treated their mother with cruelty. They then fortified Thebes by a wall, to make which the stones moved of their own accord to the music of Amphion's lyre. He married Niobe, and killed himself from grief when all his children were destroyed by Apollo.

Amphioxus, or LANCELET, a name applied to the members of a class (Cephalochorda) of primitive vertebrate animals, abundantly represented off the sandy coasts of warm and temperate seas. Lancelets can hardly be called fishes, for the structural differences between them and fishes are greater than those separating mammals from birds. That they are within the Vertebrate or Chordate series is plain from the nature of their embryonic development, and also from the presence of a dorsal nerve-cord, of a dorsal supporting axis or notochord, and of gill-slits. They can on occasion swim swiftly, but they spend most of their time burrowing in the sand, or resting in it with their mouths protruding. Their food consists of microscopic organisms and

Amphioxus (from Haeckel).

organic particles. The class includes two chief genera: (1) Branchiostoma, with the subgenera Amphioxus and Dolichorhynchus; and (2) Heteropleuron, with the subgenera Paramphioxus, Epigonichthys, and Asymmetron. From fishes they are widely removed by a number of negative characters—the absence of limbs, skull, jaws, differentiated brain, sympathetic nervous system, eye, ear, definite heart, spleen, and genital ducts. There is a dorsal tubular nerve-cord, with numerous regularly arranged 'eye-spots' on each side. The notochord or supporting rod of turgid cells is unsegmented and persists throughout life, instead of being a transient structure, giving place to the vertebral column, as in most vertebrates. It projects in a unique fashion in front of the anterior end of the nerve-cord; hence the technical name of the class, Cephalochorda. In the adult there are very numerous gill-slits, which open from the pharynx into a remarkable chamber—the abrial or peribranchial cavity. This communicates with the exterior by an atriopore. In the larval form the gill-clefts open at first directly to the exterior. The body-wall is built up of over fifty muscle-blocks or myotomes, separated by zigzag connective-tissue septa. The living animal is very translucent. There are numerous separate kidney-

tubes, and numerous, segmentally arranged, reproductive organs without ducts. The early embryo swims in the open sea. The larva is strangely asymmetrical, and the larval period is prolonged. In fact, the type is full of peculiarities, and though an offshoot from the primitive vertebrate stock, it is highly specialised on a line of its own. See E. Ray Lankester, *Contributions to the Knowledge of Amphioxus* (1889), and Arthur Willey, *Amphioxus and the Ancestry of the Vertebrates* (1894).

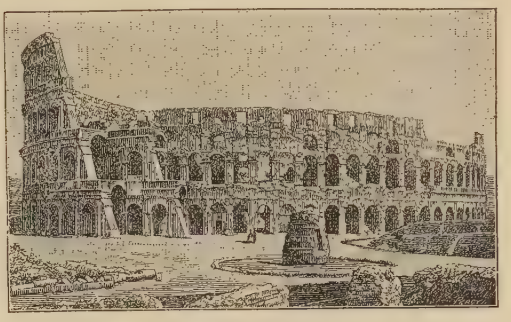
Amphipods, an order of small sessile-eyed crustaceans, with laterally compressed bodies, and long abdomen with three pairs of swimming appendages in front, and behind these three backward turned springing feet. The thoracic or anterior legs bear the gills. The order includes a great number of common forms—e.g. the familiar Sandhopper, q.v. (*Talitrus saltator*); another very frequent genus, Orchestia, sometimes much more terrestrial than the former; the abundant Gammarus of running water; the wood-boring Limnoria and Chelura; the blind Niphargus of underground fresh water; the quaint Spectre or Skeleton Shrimp, q.v. (*Caprella*); and many more. See CRUSTACEA.

Amphip'olis, a town of Macedonia, on the river Strymon, about 3 miles from the sea. The river flowed almost round the town, nearly forming a circle, whence its name *Amphi-polis* ('around' the 'city'). Taken by the Athenians in 437 B.C., it fell into the hands of Philip of Macedon in 358; and afterwards, under the Romans, became the capital of their four Macedonian provinces. It is mentioned in Acts xvii.

Amphisbæna, a general name for the members of a family (Amphisbænidæ) of worm-like, limbless lizards, which lead a burrowing life, and feed on insects and worms in the ground. They are widely distributed in the warmer parts of America and Africa, and four are Mediterranean. The soft skin is marked by little squares, vestiges of scales which are developed on the head only. The eyes and ears are hidden; the skull is very strong; the tail is very short. See LIZARDS.—The name is taken from the fabulous two-headed serpent of the Greeks (*amphis*, 'both ways;' *bainō*, 'go').

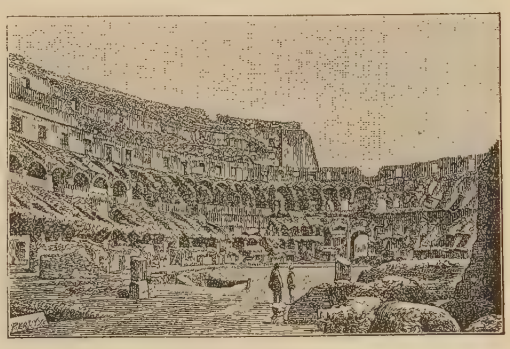
Amphissa (mod. *Salona*), a town of Locris, destroyed by Philip in the third Sacred War.

Amphithe'atre, a spacious building, generally oval in form, used by the Romans for exhibiting gladiatorial combats, fights of wild beasts, and other spectacles. The amphitheatre differed from a theatre for dramatic performances (*theatrum*) in this, that whereas the theatre had only a semicircle of seats fronting the stage, the amphitheatre was entirely encircled by them; hence the name of amphitheatre (Gr. *amphi*, 'all round'). At first these erections were of wood, and merely temporary, like a modern race-stand. They seem, however, to have been of enormous size, as Tacitus mentions one at Fidenæ, during the reign of Tiberius, whose collapse is said to have caused the death or injury of 50,000 spectators. Amphitheatres of stone had begun, however, to be erected at an earlier period than this, the first having been built in 31 B.C. at the desire of Augustus. The Flavian amphitheatre at Rome, known as the Colosseum from its colossal size, was begun by Vespasian, and finished by Titus 80 A.D., ten years after the destruction of Jerusalem. It was the largest structure of the kind, and is fortunately also the best preserved. It covers about five acres of ground, and was capable of seating 87,000 spectators. Its greatest length is 612 feet, and its greatest breadth 515, the corresponding figures for the Albert Hall in London being 270 and 240. On the occasion of its dedication by Titus, 5000 wild beasts were slain in the arena, the games lasting nearly a hundred days. The exterior is about 160 feet in height, and consists of three rows of columns, Doric, Ionic, and Corinthian, and, above all, a row of Corinthian pilasters. Between the columns there are



Colosseum—Exterior.

arches, which form open galleries throughout the whole building; and between each alternate pilaster of the upper tier there is a window. Besides the *podium*, there were three tiers or



Colosseum—Interior.

stories of seats, corresponding to the external stories. The first of these is supposed to have contained twenty-four rows of seats; and the second, sixteen. These were separated by a lofty wall from the third story, which contained the populace. The *podium* was a gallery surrounding the arena, in which the emperor, the senators, and vestal virgins had their seats. The building was covered by a temporary awning or wooden roof, the *velarium*. The open space in the centre of the amphitheatre was called *arena*, the Latin word for sand, because it was covered with sand or sawdust during the performances. The taste for the excitement of the amphitheatre which existed at Rome, naturally spread to the provinces, and large amphitheatres were erected not only in the provincial towns of Italy, as at Capua, Verona, Pompeii, Pozzuoli, &c., but at Arles, Nîmes, and Fréjus, in France; at Italica, near Seville, in Spain; and even in England, at Cirencester, Silchester, and Dorchester.

Amphitri'té, a sea-goddess in Greek Mythology, daughter of Nereus, or of Oceanus, and wife of Poseidon. When the latter demanded her in marriage, she fled to Mount Atlas, but was discovered by a dolphin, which Poseidon had sent after her, and borne back to him. In sculpture, she is often represented sitting next to Poseidon, or drawn by Tritons.

Amphit'ryon, in Greek Mythology, a king of Tiryns, son of Alcæus, and husband of Alcmene. During his absence from home in order to punish the murderers of his wife's brothers, Alcmene was visited by Zeus in the disguise of Amphitryon, who himself returned home next day. She became the mother of Hercules by Zeus, and of Iphiclès by Amphitryon. The story has been treated by Plautus in his *Amphitruo*, and after him by Molière in his *Amphitryon*, a very free adaptation of his original. Here his hero was supposed to be M. de Montespan, husband of the new mistress of Louis XIV. In the latter, Amphitryon gives a great dinner; hence the name has become a common term for a host or entertainer to dinner.

Amphiuma, a North American tailed amphibian, which loses the external gills of its youth. It thus belongs to the caducibranch group of the order Urodela. The form is roughly eel-like, and about 2 feet long; the legs, which are small and distant, have two or three toes; the eyes are covered with skin; and there are numerous teeth. On each side of the somewhat narrowed neck there is a gill slit, partly covered with a fold of skin. This type, like other *Derotremata*, as they are called, is thus half-way between those amphibians like Proteus (q.v.), which permanently retain their external gills, and those like the newt, in which the gills entirely disappear in the adults, and the clefts close up. *A. means* is found in the southern and south-western states burrowing in the mud—e.g. in the ditches of the rice-fields. It feeds on small fish, molluscs, and insects. The negroes call it the Congo snake, and erroneously regard it as venomous.

Am'phora (Lat., from Gr. *amphoreus*, shortened from *amphiphoreus*), among the Greeks and Romans, a large vessel, usually made of clay, with a narrow neck and two handles, and often ending in a sharp point below, for being inserted in a stand or in the ground. It was chiefly used for preserving various liquids, especially wine, and was frequently decorated with paintings. There is also evidence that *amphoræ* were employed as cinerary urns and as coffins. The Greek amphora contained about nine English gallons; the Roman, about six.

Amphora.

Amplitude, in Astronomy, is the distance of a heavenly body, at the time of its rising or setting, from the east or the west point of the horizon. When the sun is in the equator (i.e. at the time of either equinox), he rises exactly east, and sets exactly west, and therefore has no amplitude. His amplitude is at its maximum at midsummer, and again at midwinter; and that maximum depends upon the latitude of the place, being 23½° at the equator, and increasing to the Arctic Circle, where it becomes 90°. The amplitude of a fixed star remains constant all the year round.

Ampulla, a kind of bottle used by the Romans for the preservation of liquids. It was made either of earthenware or glass, and sometimes, though very rarely, of costlier materials. Great numbers of such vessels have found their way into collections of antiquities. They are generally 'bellied'—i.e. approaching to globular, narrowing towards the mouth, and provided with two handles. They are frequently mentioned in connection with the baths of ancient times. The *ampulla olearia* was a 'bottle of oil' which the Roman took with him when he went to the bath, and with which he anointed himself after his ablutions. Sometimes the oils were perfumed. The *ampulla Remensis* (Fr. *la sainte ampoule*) was the name of the famous vessel containing the unguent with which the French kings were anointed at their coronation at Rheims. The ampulla, a vessel for the coronation oil in the English regalia, is in the shape of an eagle. See REGALIA.

Amputa'tion (Lat. *amputare*, 'to lop' or 'prune') is the cutting off of a part which, by its injured or diseased condition, endangers, or may endanger, the safety of the whole body. The amputation of a limb was in ancient times attended with great danger of the patient's dying during its performance, as surgeons had no efficient means of restraining the bleeding. They rarely ventured to remove a large portion of a limb, preferring to allow partial separation first to take place by gangrene, when they knew there would be less bleeding; the smaller parts they chopped off with a mallet and chisel; and in both cases had hot irons at hand with which to sear the raw surfaces, boiling oil in which to dip the stump, and various resins and mosses, supposed to possess the power of arresting hemorrhage.

The desired power of controlling bleeding by simpler means had been known to the ancient surgeons of Rome and Byzantium, but was reintroduced by Ambroise Paré, surgeon to the French court, in the 16th century, who grasped the ends of cut vessels with forceps and tied them with thread. The Tourniquet (q.v.) was invented in 1674 by Morel, and improved by Petit in the next century. The ancient surgeons endeavoured to save a covering of skin for the stump, by having the skin drawn upwards by an assistant, previously to using the knife. In 1679 Lowdham of Exeter suggested cutting semicircular flaps on one or both sides of a limb, so as to preserve a fleshy cushion to cover the end of the bone. Both these methods are now in use, and are known as the 'circular' and the 'flap' operations: the latter is most frequently used in this country.

A 'flap' amputation is performed thus: The patient being placed in the most convenient position, an assistant compresses the main artery of the limb with his thumb, or a tourniquet is adjusted over it. Another assistant supports the limb. The surgeon with one hand lifts the tissues from the bone, and transfixing them with a long narrow knife, cuts rapidly downwards and towards the surface of the skin, forming a flap; he then repeats this on the other side of the limb. An assistant now draws up these flaps, and the knife is carried round the bone, dividing any flesh still adhering to it. The surgeon now saws the bone. An expert surgeon can remove a limb thus in from thirty to sixty seconds. He then, with small forceps, seizes the ends of the large arteries, and while he draws them slightly from the tissues, an assistant ties them with threads. All the vessels being secured, the tourniquet is removed, the flaps are stitched together, and the wound is dressed.

The question *when* amputation of a limb is necessary, is often, especially after an accident, one of the most difficult in surgery. The chief indications for it in these cases are—very extensive destruction or laceration of the skin; injury to the large vessels or nerves; severe splintering of the bones. The diseases most commonly requiring it are—disease of bones or joints, especially when the discharge from it threatens to exhaust the patient; tumours, especially cancer and sarcoma, which cannot otherwise be removed; and gangrene.

Amraoti (*Umravati*), capital of a great cotton-producing district in British India, is the principal cotton-mart in Berar; pop. 34,000.

Amravati (*Amaravati*), a village of the Madras Presidency, near the head of the delta of the Kistna, with the ruins of a great Buddhist tope or *stupa*, once covered with rich sculptures.

Amritsar, headquarters of Amritsar district, Lahore division of the Punjab. It is the religious metropolis of the Sikhs, a distinction which, along with its name (literally, 'pool of immortality'), it owes to its sacred tank, in the midst of which stands the marble temple of the Sikh faith. Founded in 1574, but all of it more recent than 1762, it is, next to Delhi, the richest and most prosperous city in northern India, with manufactures of Kashmir shawls, cotton, silks, &c. Pop. 160,000.

Amroha, a town in the United Provinces of India, 20 miles NW. of Moradabad; pop. 40,000.

Amrom, or AMRUM, one of the North Frisian islands of Germany, 15 miles off the west coast of Sleswick, and SW. of Föhr. It is low, sandy, grassy, and excellent for golf.

Amru Ibn Aass, an Arab soldier, joined the Prophet about 629, distinguished himself during the conquest of Palestine, and in 638 undertook the conquest of Egypt with a modest force of 4000 Arabs, which grew twentyfold through success. In 641 he took Alexandria (q.v.) after a fourteen months' siege, during which he had lost before the walls 23,000 men. The conquest of Egypt opened to the Arabs the path to conquests westwards, and Amru himself overran Tripoli and Barca. He died as governor of Egypt in 664.

Amsler, SAMUEL, engraver after Raphael and Thorwaldsen, was born at Schinznach in Switzerland in 1791, and was professor of engraving at Munich, where he died, 18th May 1849.

Amsterdam, the historic and commercial capital of the Netherlands, though not the seat of the government (see HAGUE), is situated at the influx of the Amstel to the Ij or Y (pron. *eye*), an arm (now mostly drained) of the Zuider-Zee, 44¾ miles NNE. of Rotterdam by rail. It is divided by the Amstel and numerous canals into a hundred small islands, connected by more than 300 bridges. Almost the whole city, which extends in the shape of a crescent, is founded on piles driven 40 or 50 feet through soft peat and sand to a firm substratum of clay. At the beginning of the 13th century it was merely a fishing-village, with a small castle, the residence of the Lords of Amstel. In 1296, on account of its share in the murder of Count Floris of Holland, the rising town was demolished; but in 1311, with Amstelland (the district on the banks of the Amstel), it was taken under the protection of the Counts of Holland, and from them received several privileges which contributed to its subsequent prosperity. In 1482 it was walled and fortified. After the revolt of the seven provinces (1566), it speedily rose to be their first commercial city, a great asylum for the Flemish Protestants; and in 1585 it was considerably enlarged by the building of the New Town on the west. The establishment of the Dutch East India Company (1602) did much to forward the well-being of Amsterdam, which twenty years later had 100,000 inhabitants. War with England so far reduced commerce that, in 1653, 4000 houses stood uninhabited. Amsterdam had to surrender to the Prussians in 1787, to the French in 1795; and the union of Holland with France in 1810 entirely destroyed its foreign trade, while the excise and other new regulations impoverished its inland resources. The old firms, however, lived through the time of difficulty, and in 1815 commerce again began to expand—an expansion greatly promoted by the opening in 1876 of a new waterway between the North Sea and the city (see CANAL), more direct than the North Holland Canal (see ZUIDER-ZEE) to The Helder (1825).

The city has a fine appearance when seen from the harbour, or from the high bridge over the Amstel. Church towers and spires, and a perfect forest of masts, relieve the flatness of the prospect. The old ramparts have been levelled, planted with trees, and formed into promenades. In the south are modern houses and streets and the Vondel Park. Tramways radiate from the Dam, the centre of the city. There is railway communication with all parts of the country and of Europe. Rich grassy meadows surround the city. On the west side are a great number of windmills for grinding corn and sawing wood. The three chief canals—the Heerengracht, Keizersgracht, and Prinsengracht—run in semicircles within each other, and are from 2 to 3 miles long. On each side of them, with a row of trees and a carriage-way intervening, are handsome residences. The building-material is brick; and the houses have their gables towards the streets, which gives them a picturesque appearance. The defences of Amsterdam now consist in a row of detached forts, and in the sluices, several miles distant from the city, which can flood, in a few hours, the surrounding land. The docks of Amsterdam and the North Sea Canal were enlarged in 1907, but further extensions were called for by 1913, when 2245 ships, with a tonnage of 4,177,951, cleared the port. Leading imports are coffee, cocoa, tobacco, tea, rubber, and other colonial produce, and coal.

The population, which, from 217,000 in 1794, sank to 180,000 in 1815, rose steadily to 650,000 in 1920, of whom the majority belong to the Dutch Reformed Church. Of the remainder about 100,000 are Catholics, 50,000 German Jews, and 5000 Portuguese Jews. The chief industries are sugar-refining, engineering, cutting and polishing diamonds and other precious stones, shipbuilding, fishing; and there are manufactories of sails, ropes, tobacco, silks, gold and silver plate and jewellery, colours, and chemicals; breweries, distilleries; with export houses for corn and colonial produce. Cotton-spinning, book-printing, and type-founding are also carried on. The present Bank of the Netherlands dates from 1824, Amsterdam's famous bank of 1609 having been dissolved in 1796.

The former Stadhuis ('Townhouse'), converted in 1808 into a palace for King Louis Bonaparte, and still retained by the reigning family, is a noble structure. Built by Van Kampen in 1648–55, and raised upon 13,659 piles, it extends 282 feet in length, by 235 feet in breadth, and is surmounted by a round tower rising 182 feet from the base. It has a hall, 120 feet long, 57 wide, and 90 high, lined with white Italian marble—an apartment of great splendour. The cruciform *Nieuwe Kerk* (New Church), a Gothic edifice of 1408–14, is the finest ecclesiastical structure in the city, with a splendidly carved pulpit, and the tombs of Admiral de Ruyter, the great Dutch poet Vondel, and various other worthies. The Old Church (*Oude Kerk*), built in the 14th century, is rich in painted glass, has a grand organ, and contains several monuments of naval heroes. Literature and science are represented by two universities (one supported by the municipality, the other a Free University), by academies of arts and sciences, by museums and picture galleries, a palace of national industry, fine zoological gardens, a botanical garden, several theatres, &c. The Ryksmuseum contains a truly national collection of paintings, its choicest treasure being Rembrandt's 'Night-guard.' Rembrandt (q.v.) made Amsterdam his home; and his statue (1852) now fronts the house he occupied. Spinoza was a native.

Amsterdam, a city of New York, is 33 miles NW. of Albany, has woollen and other kinds of factories, foundries, and machine-shops, an academy, and a hospital; pop. 34,000.

Amsterdam, New, a volcanic, wooded islet, 25 sq. m. in area, in 37° 50′ S. lat. and 77° 30′ E. long., midway between the Cape of Good Hope and Tasmania. It belongs to France, like St Paul (q.v.).

Amu-Daria. See Oxus, Khiva.

Am′ulet, any object worn as a charm. It is often a stone, or piece of metal, with an inscription or some figures engraved on it, and is generally suspended from the neck, and worn as a preservative against sickness or witchcraft. Its origin, like its name, seems to be oriental. The ancient Egyptians had their amulets, sometimes forming necklaces. Among the Greeks, such a protective

Egyptian Amulet.

charm was styled *phylaktērion.* Pliny gives the Latin name, *amuletum,* a word of unknown origin. It has been conjecturally compared with the modern Arabic *himālah-at* (literally 'a carrier,' 'bearer'), now applied to a shoulder-belt or cord, frequently used to secure a small Koran or prayer-book on the breast, regarded as an amulet; but the resemblance between this word and the Latin *amuletum* is purely accidental. The phylacteries of the Jews (see Matt. xxiii. 5), slips of parchment on which passages of the Law were written, were evidently worn as badges of piety by the Pharisees; but were also regarded as wholesome preservatives from evil spirits, and from all manner of harm. From the heathen, the use of amulets passed into the Christian Church, the usual inscription on them being *ichthys* (the Greek word for a fish), because it contained the initials of the Greek words for Jesus Christ, Son of God, Saviour. Among the Gnostic sects, Abraxas stones (q.v.) were much used. Amulets soon became so common among Christians that, in the 4th century, the clergy were interdicted from making and selling them on pain of deprivation of holy orders; and in 721, the wearing of amulets was solemnly condemned by the church. Among the Turks and the tribes of Central Asia, every person considers it necessary to wear a preservative charm. With the spread of Arabian astronomy, the astrological amulet or Talisman (q.v.) of the Arabs found its way to Europe. Among amulets in repute in the middle ages were the coins attributed to St Helena, the mother of Constantine. These and other coins marked with a cross were thought specially efficacious against epilepsy, and are generally found perforated, for the purpose of being worn suspended from the neck.

Amundsen, Roald, a Norwegian polar explorer (born in 1872), the first to navigate the North-west Passage (1906) and to reach the South Pole (14th December 1911), attempted the North Pole by air in 1925, and achieved it in 1926. He went to the rescue of the Italian airship party in 1928, and was lost. See *My Life as an Explorer* (1927) and Polar Exploration.

Amur, a Siberian river formed by the junction of the Shilka and the Argun, which both come from the south-west—the former rising in the foothills of the Yablonoi Mountains. From the junction, the river flows first south-east and then north-east, and, after a total course of 3060 miles, falls into the Sea of Okhotsk, opposite the island of Sakhalin. Its main tributaries are the Sungari and the Ussuri, both from the south. The area of the river-basin is estimated at 750,000 sq. m. The Amur is navigable. Sandbanks, however, make Nikolaevsk (q.v.), near its mouth, difficult of approach from the sea; ice restricts the navigation season to five months; and summer brings severe floods.

From as early as 1636 Russian adventurers made excursions into the Chinese territories of the Lower Amur. In 1666 they built a fort at Albazin, and succeeded in navigating from that fort to the mouth of the river. In 1685 the fort was taken and destroyed by the Chinese, but was retaken promptly by the Russians, who again, in 1689, abandoned it and the whole of the Amur to the Chinese. But soon fur-hunters of Siberia, Russian traders, and adventurers, encouraged by government, continued to pursue their vocations on Chinese ground. In 1854–56 two military expeditions were conducted by Count Muravieff, who twice descended the river, unopposed by the Chinese, and established the stations of Alexandrovsk and Nikolaevsk. In 1858 China agreed to the treaty of Tientsin, by which the boundaries of Russia and China were defined. The left bank of the Amur, and all the territory north of it, became Russian; and below the confluence of the Ussuri, both banks. In 1860 the more temperate territory east and south of the Ussuri was acquired by treaty. Japan, which obtained southern Sakhalin in 1909, sought a footing on the Amur after the Russian revolutions. The Amur region became part of the 'Far Eastern Republic,' which included also Transbaikalia.

The *Pri-Amur* or Amur region of Eastern Siberia is bounded on the north by the Stanovoi Mountains; it has an area of about 980,000 sq. m., with over 1,000,000 inhabitants, and was divided in imperial times into the Maritime Province (Primorskaya), Kamchatka, (north) Sakhalin or Saghalien, and Amur Province, all under a governor-general at Khabarovsk. The Trans-Siberian railway greatly increased Russian immigration; in 1902–12 over 177,000 settlers arrived. The principal ports are Vladivostok, Nikolaevsk, Petropavlovsk, and Alexandrovsk. The chief exports are soya beans (from Manchuria), timber, fish, furs, skins, and gold; coal, zinc, and silver-lead are worked.

The *Amur Province* (area 154,780 sq. m.) lies inland, north of the Amur, over against Heilung and between Transbaikalia and Khabarovsk. The capital is Blagovestchensk (pop. 63,000). The province is richly timbered and contains large level tracts of fertile land. Gold is mined. Tunguses occupy the high plateaus, Russian settlers the riverside. Communication till 1915 was by the Amur to the sea or by the Shilka to Sryetensk on the Trans-Siberian railway. Great developments, however, are expected to result from the completion of the Amur railway. This railway was constructed in 1907–15, solely by Russian labour, notwithstanding great engineering difficulties and terrible extremes of climate, carrying the Trans-Siberian line from Transbaikalia entirely through Russian territory, passing north of the Shilka and Amur, and crossing the latter to Khabarovsk (by a bridge 7038 feet long), whence the Ussuri railway runs to Vladivostok. See also Siberia.

Amurath, or Murad, the name of five sultans of Turkey (q.v.).

Amurnath ('Immortal Lord'—i.e. Siva), the name of (1) a village in Kalyau talulla (Bombay) with a very old Hindu temple; (2) a cave in Kashmir believed to be Siva's residence.

Amy′clæ, (1) an ancient town of Laconia, on the eastern bank of the Eurotas, 2½ miles SE. of Sparta. It was the home of Castor and Pollux, the 'Amyclæan brothers.' It was conquered by the Spartans

only before the first Messenian war.—(2) An ancient town of Latium, which claimed to have been built by a colony from the Greek Amyclæ.

Amygdaleæ, a sub-order of Rosaceæ (q.v.). See also ALMOND, CHERRY, PEACH, NECTARINE, PLUM.

Amyg′dalin, $C_{20}H_{27}NO_{11}3H_2O$, is a crystalline principle existing in the kernel of bitter almonds, the leaves of the *Prunus lauro-cerasus*, and various other plants, which, by distillation, yield hydrocyanic acid. It is obtained, by extraction with boiling alcohol, from the paste or cake of bitter almonds, which remains after the fixed oil has been separated by pressure. When obtained pure, it has a sweetish, somewhat bitter taste, and is not poisonous, and when treated with alkaline solvents, ammonia is expelled, and amygdalic acid, $C_{20}H_{26}O_{12}$, is produced. Its most remarkable change is, however, that which is noticed in the article Volatile Oil of Almonds (q.v.), and which may be thus briefly stated. When the bruised almond kernel, or almond paste, is brought in contact with water, the peculiar odour of bitter almonds is almost immediately evolved; and in twenty-four hours all traces of amygdalin will have disappeared, its place being taken by essential oil of almonds, hydrocyanic acid, sugar, and formic acid. This transformation is due to the presence of a peculiar nitrogenous matter called Emulsin (q.v.), or synaptase, which sets up a kind of fermentation.

Amyg′daloid (Gr. *amygdalē*, 'an almond'), an igneous crystalline or, as the case may be, vitreous rock (lava), containing numerous cells, which owe their origin to the segregation and expansion of steam, with which all lavas are more or less charged at the time of their eruption. The cells vary in size from mere pores up to cavities several inches or even feet in diameter—these last, however, being exceptional, and when they do occur, quite sporadic. The cells are generally flattened or drawn out in the direction of flow of the lava, and are frequently filled with mineral matter (amygdules), subsequently introduced by infiltrating water. This is the origin of many of the agates and so-called 'Scotch pebbles' of jewellers. As cells and cellular structure occur in many different kinds of igneous rock, the term *amygdaloid* no longer denotes a rock-species, and has therefore fallen into disuse. It is now only employed in the adjectival form, *amygdaloidal*, as indicating a cellular or slaggy-like structure, in which the pores and cells are more or less filled up with mineral matter.

Am′yl, C_5H_{11}, is the fifth in the series of alcohol radicals whose general formula is C_nH_{2n+1}, and of which methyl and ethyl are the first two members. It is obtained by heating amyl-iodide with an amalgam of zinc in a closed tube at a temperature of about 350° F. (177° C.), and is one of the natural products of the distillation of coal. As thus obtained, it represents two molecules of the radical united together, and usually goes by the name *diamyl*, $(C_5H_{11})_2$. The single molecule, C_5H_{11}, has not been produced. Diamyl is a colourless liquid, with a specific gravity of ·770 at 52° F. (11° C.), and a boiling-point of about 316° F. (158° C.). It has an agreeable smell and burning taste. It enters into a large number of chemical compounds, most of which—as, for instance, bromide, chloride, iodide, &c.—are derived from amylic alcohol, which bears precisely the same relation to amyl that ordinary alcohol bears to ethyl, C_2H_5. Amylic alcohol is sufficiently described in the article FUSEL OIL, which is the name given to the crude alcohol. It seems invariably to accompany ordinary alcohol when the latter is prepared by fermentation, and apparently occurs in largest quantity in those liquids which remain most alkaline during fermentation.

AMYL, NITRITE OF, $C_5H_{11}NO_2$, a valuable drug which must not be confounded with *Nitrate* of Amyl, may be prepared by the action of nitric acid on fusel oil (amylic alcohol). It is a pale yellowish liquid, with an ethereal fruity odour, the vapour of which, when inhaled, even in very small quantity, causes violent flushing of the face and a feeling as if the head would burst. It is a very powerful remedy in all convulsive diseases, and is of special value in angina pectoris, as well as in asthma. Owing to its volatile nature it is usually kept in small glass globes containing from two to five drops, one of which, when crushed in the handkerchief, and the vapour breathed, will often give immediate relief.

Am′yloid (Gr. *amylon*, 'starch') is a term used in Chemistry and Botany, and generally equivalent to 'starchy.' Amyloids are substances like starch, dextrine, sugar, gum, &c., which consist of carbon, hydrogen, and oxygen, the latter two being always in the proportion in which they occur in water, H_2O. The animal body, chemically considered, is a mixture of Proteins (q.v.), amyloids or carbohydrates, and Fats (q.v.), plus water and mineral constituents, and the normal food always contains these constituents. Of the three items, proteins are, however, absolutely essential, amyloids and fats only desirable accessories. In the human body the most important carbohydrates are glycogen, $C_6H_{10}O_5$; grape-sugar or dextrose, $C_6H_{12}O_6$; maltose, $C_{12}H_{22}O_{11}$; and milk-sugar, $C_{12}H_{22}O_{11}$. See ANIMAL CHEMISTRY. A compound radical called *Amyl* (q.v.) is formed by the decomposition of starch in a peculiar fermentation—the *amylic fermentation*—but to it the term amylaceous has no reference.

Amyot, JACQUES (1513–93), a French classical scholar who, born at Melun of humble parentage, rose to be professor of Latin and Greek at Bourges, tutor to Henry II.'s sons, and bishop of Auxerre. His translations of Plutarch, Diodorus, &c. are remarkable for their fine style. Sir Thomas North (q.v.) Englished Amyot's version of Plutarch's *Lives*.

Amyot, JOSEPH (1718–94), a French Jesuit missionary in China who compiled a Tatar-Manchu dictionary and memoirs on Chinese history, science, and art.

Amyridaceæ, a sub-order of the Terebinthaceæ of some botanists, trees and shrubs remarkable for the abundance of their fragrant resinous juice. To the sub-order belong Myrrh (q.v.), Frankincense (q.v.), &c.

An′a, a termination added to proper names to designate collections of sayings, 'table-talk,' anecdotes, items of gossip, as *Johnsoniana*, *Boswelliana*; as well as notes about some person, or publications bearing upon him, as *Shakespeariana*, *Burnsiana*. Such titles were first used in France, where they became common after the publication of *Scaligerana* by the brothers Dupuy (1666). In English literature there are many works of this kind, from *Baconiana* (1679) to *Dickensiana* (1886). America, also, has its *Washingtoniana* (1800). A tolerably complete catalogue of such works up to its own date may be found in Namur's *Bibliographie des Ouvrages publiés sous le Nom d'Ana* (Brussels, 1839).

Anabaptists, a term often applied to those Christians who reject infant baptism and administer the rite only to adults; so that when a new member joins them, he or she, if baptised in infancy, is baptised a second time. The name (from Gr., 'to baptise again') is thus due to an accidental circumstance, and is disclaimed by the more recent opponents of infant baptism both on the Continent

and in Great Britain. It is properly applied to a set of fanatical enthusiasts called the Prophets of Zwickau, in Saxony, at whose head were Thomas Münzer (1520) and others, who appeared shortly after the beginning of the Reformation. Münzer went to Waldshut, on the borders of Switzerland, which soon became a chief seat of anabaptism, and a centre whence visionaries and fanatics spread over Switzerland. They pretended to new revelations, dreamed of the establishment of the kingdom of heaven on earth, and summoned princes to join them, on pain of losing their temporal power. They rejected infant baptism, and taught that those who joined them must be baptised anew with the baptism of the Spirit; they also proclaimed the community of goods and the equality of all Christians. These doctrines naturally fell in with and supported the 'Peasant War' (q.v.) that had about that time (1525) broken out. The sect spread rapidly through Westphalia, Holstein, and the Netherlands, in spite of the severest persecutions. At the battle of Frankenhausen the princes of Saxony, Hesse, and Brunswick crushed its progress in Saxony and Franconia. Still, scattered adherents of the doctrines continued. Melchior Hoffmann, a furrier of Swabia, who appeared as a visionary preacher in Emden in 1528, installed a baker, John Matthiesen, of Haarlem, as bishop. Matthiesen began to send out apostles of the new doctrine. Two of these went to Münster, where they found fanatical coadjutors in the Protestant minister Rothmann, Knipperdolling, Bockhold, and others. With their adherents, they soon made themselves masters of the city; Matthiesen set up as a prophet, and, encouraged by a previous success, lost his life in a mad sally, with only thirty followers, against Count Waldeck, the prince-bishop of Münster, who was besieging the town. The churches were now destroyed, and twelve judges were appointed over the tribes, as among the Israelites; and Bockhold (1534) had himself crowned king of the 'New Zion,' under the name of John of Leyden. The anabaptist madness in Münster now went beyond all bounds. The city became the scene of the wildest licentiousness; until several Protestant princes, uniting with the bishop, took the city, and by executing the leaders after the cruellest tortures, put an end to the new kingdom (1535).

But the principles disseminated by the Anabaptists were not so easily crushed. Adherents of the sect had been driven to the Netherlands; and in Amsterdam the doctrine took root and spread. Bockhold also had sent out apostles, some of whom had given up the wild fanaticism of their master; abandoning the community of goods and women, they taught the other doctrines of the Anabaptists, and the establishment of a new kingdom of pure Christians. They grounded their doctrines chiefly on the Apocalypse. One of the most distinguished of this class was David Joris, a glass-painter of Delft (1501–56), who devoted himself to mystic theology, and sought to effect a union of parties. He acquired many adherents, who studied his Book of Miracles (*Wunderbuch*), which appeared at Deventer in 1542, and looked upon him as a sort of new Messiah. Being persecuted, he withdrew from his party, lived inoffensively at Basel, under the name of John of Bruges, and died there in the communion of the reformed church.

The rude and fanatical period of the history of anabaptism closes with the scandal of Münster. A new era begins with Menno Simons (see MENNONITES), who collected many of the scattered adherents of the sect, and founded congregations in the Netherlands and in Germany. His followers, however, expressly repudiated the distinctive doctrines of the Münster fanatics; and so little had their sober and moderate life in common with the excesses of the latter, that the application of the term Anabaptists to them is unjustifiable. As a matter of fact, the German Anabaptists have left no representatives; and those bodies in England and America who resemble them only in practising adult baptism are discussed at BAPTISTS. See Belfort Bax's *Rise and Fall of the Anabaptists* (1903).

Anabasidæ. See CLIMBING PERCH.

Ana'basis (Gr., literally, 'an ascent' or 'a march out of a lower into a higher country'), the name of two historical works: (1) The *Anabasis of Cyrus*, written by Xenophon, which gives a narrative of the unfortunate expedition of the younger Cyrus against his brother, the Persian king Artaxerxes, and of the retreat of his 10,000 Greek allies under the command of Xenophon, after the battle of Cunaxa (401 B.C.). (2) The *Anabasis of Alexander*, written by Arrian, and giving an account of the campaigns of Alexander the Great.

Anableps (Gr. *anablepsis*, 'looking up'), a genus in Agassiz's cyprinodont family of bony fishes with open air-bladders. They are especially noteworthy for their projecting eyes, which are divided into an upper and lower portion. The outer covering or *cornea* is crossed by a dark band, and the inner *iris*

Anableps tetropthalmus.

is similarly divided, so that there are really two pupils instead of one. This unique structure is supposed to be associated with a habit which these fishes are said to have of swimming with the eyes partly out of the water. *A. tetropthalmus* inhabits the rivers of Guiana and Surinam.

Anabolism, a general name for the constructive chemical processes which go on in the living body, in contrast to the opposite, but simultaneously proceeding, disruptive processes summed up in the term Katabolism. In other words, vital metabolism has two phases—the one tending to up-building, construction, assimilation; the other tending to down-breaking, disruption, disassimilation. See METABOLISM, PHYSIOLOGY, PROTOPLASM.

Anacardiaceæ. See TEREBINTH; also CASHEW NUT, PISTACIA, MANGO, SUMACH.

Ana'charis, a genus of plants of the natural order Hydrocharideæ, of which a species, *Anacharis alsinastrum* (*Elodea canadensis*), has become naturalised in Britain. It is a native of North America, growing in ponds and slow streams; and is a dark-green, much-branched perennial, entirely floating under water. The plant was first found in Britain in 1842, by Dr Johnston, in the lake of Duns Castle; and again in 1847 in Leicestershire The male flowers, rare as compared with the female flowers even in America, were unknown in Britain till seen by the late Mr David Douglas in a pond on the Braid Hills near Edinburgh, in August 1880 (see *Science Gossip*, Nov. 1880). The plant is now very abundant and troublesome in the Trent, Derwent, and other rivers; in fact, much more so than in America. Its rapidity of growth is extraordinary. Immense masses disfigure the shallows of the Trent, and cover the

beds of the deeps. It strikes its shoots under the mud in a lateral direction for six inches or a foot, and then rises and spreads. The stems are very brittle, and every fragment is capable of growing, so that the means usually adopted to get rid of it serve also for its propagation. It appears that water-fowl are very fond of it; and by them, probably, it is easily conveyed from one pond or river to another. It has been found that swans may be fed upon it with advantage, and its excessive growth kept down more effectually in this way than in any other. It seems to be an impediment to the progress of salmon ascending the rivers in which it occurs; but for some kinds of fish it probably affords both food and shelter. The manner of its introduction into Britain is unknown, although it has been conjectured that it may have escaped from some garden-pond—a conjecture the more doubtful, from the distance between the localities in which it was first found; but its rapid increase is of great scientific interest, in connection with the important subject of the distribution of species. As being over-abundant in canals and water-courses, the plant involves some serious economic considerations. It is remarkable that in North America, its native land, it never grows so as to block the rivers. The plant is also of interest to vegetable physiologists, since exhibiting peculiarly well, under moderate power of the microscope, the phenomenon of circulation of the protoplasm within the cells.

Anacharis alsinastrum.

Anachar'sis, a Scythian prince who travelled widely in quest of knowledge, and visited Athens in the time of Solon. He was received with great respect for his remarkable wisdom, and was admitted to the Athenian franchise. The letters which bear his name were written long after his time. It is said that, after his return to his native land, he was put to death by order of the king, who feared the introduction of the Greek mysteries, in which it was supposed that Anacharsis had been initiated. J. J. Barthélemy (q.v.) borrowed his name for that of the hero of his *Voyage du Jeune Anacharsis en Grèce* (1788).

Ana'chronism (Gr. *ana*, 'backwards,' *chronos*, 'time'), the erroneous reference of a circumstance or custom to a wrong date; as when Shakespeare, in *Troilus and Cressida*, makes Agamemnon quote Aristotle, or Raphael represents the Blessed Virgin as an Italian *contadina*. Etymologically, it should apply only to a date which is too early—*prochronism*, but it is also used of too late a date—*parachronism*. Anachronisms may be made in regard to mode of thought and style of writing, as well as in regard to mere events; and, indeed, many persons lack the historical sense and the feeling of historical perspective so much, that their whole conceptions of the past are nothing but a continuous anachronism. It is difficult for a writer to project himself so completely into a past age as to breathe freely in its atmosphere. Most of our so-called historical novels, however good as novels, are of but little value to the serious student of history. Even the glowing imagination of a Scott or Kingsley can hardly make more of their old-world figures than nineteenth-century men and women in antique garb. There is hardly a novel of its class that contains more study than Thackeray's *Esmond*, yet here a Jacobite whistles 'Lilliburlero,' and a book is spoken of in 1712 which was not published until 1750. Sometimes an anachronism is purposely made for the sake of effect, or to bring certain events within convenient compass for dramatic purposes. Thus, Shakespeare makes Cassius say, in *Julius Cæsar*, 'The clock hath stricken three;' and Schiller, in his *Piccolomini*, introduces a lightning-conductor more than a hundred years before the date of its invention. These discrepancies, however, do not seriously injure the general truth of a poetical work. The anachronism is more offensive when, in a work which pedantically adheres to the costumes and other external features of old times, we find a modern style of thought and language, as in the old French dramas of Corneille and Racine. In popular epic poetry it is a common feature. Achilles is always young; Helena, always beautiful. In their versions of old classic traditions, the writers of the middle ages converted Alexander, Æneas, and other ancient heroes, into good Christian knights of the 12th century. In the *Nibelungen-lied*, Attila and Theodoric are good friends and allies, though the latter began to reign some forty years after the former. At the end of the poem, the heroine, who must have been nearly sixty years old, is still 'the beautiful Queen Kriemhild.'

Anacolu'thon is a term employed both in Grammar and Rhetoric, to denote the absence of strict logical sequence in the grammatical construction. Good writers sometimes sacrifice the logical sequence to emphasis, clearness, or graceful arrangement. An example is Coleridge's 'His young and open soul—dissimulation is foreign to its habits.' In colloquial speech, nothing is more common than examples of anacoluthon.

Anaconda (*Eunectes murinus*), a large South American water-snake of the Python family, closely related to the boa-constrictor. The upper part of the front of the head is armed with shield-like plates, replaced by scales farther back. The minute vertical nostrils at the end of the snout can be entirely closed, a fact in association with the aquatic habit of the animal. In size it is hardly exceeded, unless by the pythons, as some specimens have measured from 25 to 30 feet in length. The general colour of the adult is blackish green, with rows of spots along the back and sides. Traces of the hind-legs can be detected. The anaconda is ovoviviparous. It is found in the rivers of Guiana and Brazil, swimming like an eel, or floating with the stream, or lying in wait by the bank for the agoutis, pacas, capybaras, ant-eaters, iguanas, &c. on which it feeds. It is comparatively helpless on land, and is then often killed. The skin is used for making boots and bags, the fat is also utilised, and the flesh is sometimes eaten. See Boa Constrictor, and Python.

Ana'creon, one of the most esteemed lyric poets of Greece, was born about 550 B.C. at Teos, an Ionian city in Asia Minor. With his fellow-townsmen he emigrated to Abdera, in Thrace, on the approach of the Persians. Thence he was invited to the court of Polycrates, the ruler of Samos; and here he sang, in light and flowing strains, the praise of wine and beauty. After the death of Polycrates, he went to Athens, and was received with distinguished honour by Hipparchus. We know nothing certain of his life after the fall of Hipparchus, but that he left Athens; and tradition tells that he died at the age of 85, by being choked by a dried grape.

Great honours were paid to him after his death; Teos put his likeness upon its coins, and a statue was raised to him on the Acropolis of Athens, which represented him in a state of vinous hilarity.

Of his poems, only a few genuine fragments have been preserved, for the *Odes* attributed to him are now admitted to be spurious. Of these there are about sixty, devoted to love and wine, marked by great simplicity and delicacy of expression, fertility of invention, and variety of illustration. Moore found a congenial task in translating them into English verse. The genuine fragments appear in Bergk's *Poetæ Lyrici Græci* (5th ed. vol. iii. 1900).

Anacyc'lus. See PELLITORY OF SPAIN.

Anadyom'ené ('emerging'), a name given to Aphrodite from her being born of the sea-foam. Apelles gave the name its celebrity from his masterpiece, a painting of the goddess in the moment of rising from the sea, wringing her flowing wet hair. Phryne was supposed to have supplied the model. The Coans placed the picture in the temple of Asklepios. Augustus afterwards placed it in the temple of Venus as the ancestress of the Julian house.

Anadyr, or ANADIR, a sea or gulf of North-east Siberia, and a resort of whalers. The Anadyr River flows into the Gulf of Anadyr, after a course of about 500 miles from the Stanovoi Mountains, through a rocky and barren country.

Anæmia (Gr., 'bloodlessness') denotes a condition in which the blood is deficient either in quantity or quality for the adequate performance of its functions. The total quantity of blood in the body may be diminished. More commonly there is no alteration in the total quantity, but the number of red corpuscles is reduced below the normal 5,000,000 per cubic millimetre. Again, while there may be little or no diminution in their number, the corpuscles may be small and poorly endowed with their most important constituent, hæmoglobin, which acts as the carrier of oxygen from the lungs to the tissues. Deficiency of hæmoglobin is the essential feature in all forms of anæmia.

The symptoms due to anæmia *per se* are weakness and languor; breathlessness, palpitation, and faintness; headache, sleeplessness, and irritability; digestive troubles and, in women, menstrual disturbance. The patient usually looks pale, but in persons who have been exposed to the weather this may not be conspicuous, and the pallor must be sought in the lips, gums, and the inner surface of the eyelids. In cases where the anæmia is not associated with severe illness the patient usually remains or becomes plump, partly because the tissues are not so readily oxidised, and partly because of the patient's lethargy.

Pernicious anæmia occurs most commonly between the ages of thirty and fifty, though no age is exempt. In this country, at least, it is more common in males. It may follow depressing conditions of any kind, but in many instances no such history can be obtained. In typical cases, besides the signs common to all anæmias, there is a lemon-yellow pallor of the skin, a tendency to febrile attacks, and gastro-intestinal disturbance. The blood shows a remarkable reversion to the type found in the early embryo. The number of red corpuscles may fall to a lower figure than is reached in any other condition. The hæmoglobin is necessarily diminished also, but the average size of the corpuscles is greater than normal, so that the hæmoglobin value of each corpuscle is increased. Such blood is said to show a high colour index. The disease is due to some unknown toxic agency affecting not only the blood but its source, the red bone marrow. The condition is a serious one. Acute cases may die within a month of onset, but chronic cases may live for more than ten years. There is an extraordinary tendency to remission and relapse. Arsenic seems to exert a favourable influence on the course of the disease.

Chlorosis is the subject of a separate article.

Secondary or *symptomatic anæmia* may arise from a very large number of causes. The most obvious is hæmorrhage, either from a wound, a ruptured vessel, or ulcerated surface, from various parts of the body in the bleeding diseases, from the respiratory, urinary, or genital passages. The suddenness of onset in many of these conditions may add to the severity of symptoms. Blood may be lost so quickly that the heart cannot readily accommodate its work to the diminished quantity of fluid, and circulatory embarrassment and faintness may result. Few conditions give rise to such acute mental anxiety as hæmorrhage. Other causes of secondary anæmia are blood destruction, from the action of such agencies as the malarial parasite; poisons which shorten the life of the corpuscles or diminish the activity of the bone-marrow—e.g. fevers, sepsis, cancer, and syphilis; improper nourishment and unfavourable surroundings; exhausting conditions, such as chronic catarrh, Bright's disease, and prolonged lactation. The symptoms are often largely masked by those of the causal condition which may also obscure the blood picture. In most cases there is pallor without the yellow tint of pernicious anæmia or the green complexion of chlorosis. The colour index may be low, but seldom shows much departure from unity; i.e. corpuscles and hæmoglobin are reduced proportionately. The course and treatment vary with the cause.

Other varieties of anæmia, such as *splenic anæmia* and *aplastic anæmia*, are exceedingly rare. Certain diseases of the bone-marrow, such as leucocythæmia, in which there is a great increase in the number of white cells in the blood, were formerly classified with the anæmias. Such conditions may be important causes of anæmia, but are no longer included among its manifestations.

For miners' anæmia, see ANKYLOSTOMIASIS.

Anæsthe'sia (Gr., 'lack of sensation') is a term used to express a loss of sensibility to external impressions, which may involve a part or the whole surface of the body. It may occur naturally as the result of disease, or may be produced artificially by the administration of *anæsthetics*. In some diseased conditions of the nervous centres, a part of the body may become totally insensible to pain, while in another part sensation may be unnaturally acute, constituting a state of hyperæsthesia. When a nerve is divided, there is no feeling of touch or pain referred to the parts which it supplies, because these are cut off from communication with the brain; and in some diseases, as European leprosy, a loss of sensation in patches of the skin is an early and characteristic symptom. Insensibility to external impressions may be either *general*—i.e. affecting the whole body, or *local*, where only that part is affected to which the anæsthetic agent is applied.

In ancient writers, we read of insensibility or indifference to pain being obtained by means of Indian hemp (*Cannabis indica*), either smoked or taken into the stomach. The Chinese, more than 1500 years ago, used a preparation of hemp, or *ma-yo*, to annul pain. The Greeks and Romans used mandragora for a similar purpose (*poiein anaisthēsian*); and as late as the 13th century, the vapour from a sponge filled with mandragora, opium, and other sedatives was used. The mandragora, however, occasionally induced convulsions, with other alarming symptoms; and though

Bullein, an English physician (died 1579), mentions the possibility of putting patients who were to be operated upon into 'a trance or a deepe terrible dreame' by its use, it gradually became obsolete, and was banished from the pharmacopœia. John Baptista Porta, of Naples, in his work on Natural Magic (1597), speaks of a quintessence extracted from medicines by somniferous *menstrua*. This was kept in leaden vessels, hermetically closed, lest the *aura* should escape. 'When it is used, the cover being removed, it is applied to the nostrils of the sleeper, who draws in the most subtile power of the vapour by smelling, and so blocks up the fortress of the senses, that he is plunged into the most profound sleep, and cannot be roused without the greatest effort. . . . These things are plain to the skilful physician, but unintelligible to the wicked.' In 1784, Dr Moore, of London, used compression on the nerves of a limb requiring amputation, but this method was in itself productive of much pain. In 1800, Sir Humphry Davy, experimenting with the nitrous oxide or *laughing-gas*, suggested its usefulness as an anæsthetic; and in 1828, Dr Hickman suggested carbonic acid gas.

As early as 1795, Dr Pearson had used the vapour of sulphuric ether for the relief of spasmodic affections of the respiration. The fact that sulphuric ether could produce insensibility was shown by the American physicians, Godwin (1822), Mitchell (1832), Jackson (1833), Wood and Bache (1834); but it was first used to prevent the pain of an operation in 1846, by Dr Morton, a dentist of Boston. The news of his success reached England on 17th December 1846; on the 22d, Mr Robinson, a dentist, and Mr Liston, the eminent surgeon, operated on patients rendered insensible by the inhalation of sulphuric ether. This material was extensively used for a year, when Sir J. Y. Simpson, of Edinburgh, discovered the anæsthetic value of Chloroform (q.v.) when inhaled, and introduced the use of it into his department, midwifery. Since that time chloroform has been the anæsthetic in general use in Europe, but ether is preferred in America. It is now the opinion of most medical men that chloroform should not be given where there is weak action of the heart from disease. Other substances have been used by inhalation, such as nitrous oxide gas, which is the best and safest anæsthetic for operations that last only one or two minutes, as in the extraction of teeth. At present the safer combination is alcohol 1, chloroform 2, ether 3 parts, known as 'A.C.E.' or '1.2.3.'

The employment of general anæsthetics in surgery has greatly increased the scope of the surgeon's usefulness, and has been a great boon to suffering humanity. It is, however, fraught with a certain amount of danger. However much care may be taken in administration, an occasional fatal accident occurs from the action of the anæsthetics employed. In these cases there is generally disease of the heart, or a hypersensitive nervous system, predisposing to sudden sinking, or to shock, or preceding bronchitis or kidney trouble.

Local anæsthesia, artificially produced, is of great value in minor operations, and in painful affections of limited areas of the body. It depends upon a paralysis of the sensory nerves of the part, and may be induced by the application of *cold*, or of medicinal agents. An ether spray thrown on the part, produces such intense cold by its evaporation, that the part is completely numbed, and a layer of ice forms on its surface. The after effects, however, when reaction sets in, are very painful, and there is danger that in weak constitutions sloughing and ulceration may follow. Of medicinal agents, the best is *cocaine*, prepared from the coca shrub of Peru (*Erythroxylon coca*). In the form of a five to ten per cent. watery solution, this drug is introduced into the tissues by a hypodermic needle, and produces complete anæsthesia of the part thus treated in from three to fifteen minutes. Rarely it produces giddiness, but has no unpleasant local after effects. Thymol, menthol, aconite, belladonna, chloroform (the last three as the well-known A B C liniment), phenol, chloral, and Indian hemp, have also a local anæsthetic action if rubbed on the skin, or applied to abraded surfaces.

Anagallis. See PIMPERNEL.

Anagni, a town of Italy, on a hill, 40 miles ESE. of Rome. The seat of a bishop since 487, it has an old, but much modernised cathedral, and was the birthplace of four popes—Innocent III., Gregory IX., Alexander IV., and Boniface VIII. The chief city of the Hernici, it was a place of importance during the whole period of Roman history, and Virgil mentions it as 'wealthy Anagnia.' Pop. 10,500.

An'agram (Gr. *ana*, 'up,' and *gramma*, 'a letter of the alphabet'), the transposition of the letters of a word, phrase, or short sentence, so as to form a new word or sentence. It originally signified a simple reversal of the order of letters, but has long borne the sense in which it is now used. The Cabalists attached great importance to anagrams, believing in some relation of them to the character or destiny of the persons from whose names they were formed. Plato entertained a similar notion, and the later Platonists rivalled the Cabalists in ascribing to them mysterious virtues. Although now classed among follies, or at best among ingenious trifles, anagrams formerly employed the most serious minds, and some of the Puritan writers commended the use of them. Cotton Mather, in his elegy on the death of John Wilson, the first pastor of Boston, in New England, mentions

> His care to guide his flock and feed his lambs
> By words, works, prayers, psalms, alms, and *anagrams*.

The best anagrams are such as have, in the new order of letters, some signification appropriate to that from which they are formed. It was a great triumph of the medieval anagrammatist to find in Pilate's question, '*Quid est veritas?*' (What is truth?) its own answer: '*Est vir qui adest*' (It is the man who is here). With equal appropriateness, Horatio Nelson may read '*Honor est a Nilo*' (Honour is from the Nile), and Florence Nightingale, 'Flit on, cheering angel.' Anagrams, in the days of their popularity, were much employed, both for complimentary and for satirical purposes; and no little straining was often employed in the omission, addition, or alteration of letters, although, of course, the merit of an anagram depended much upon its accuracy. An interesting survival of anagram-making was seen in the absurd word-competitions for large money prizes, offered about the time of Queen Victoria's jubilee (1887), ostensibly to celebrate the occasion.

Marie Touchet, the name of a favourite mistress of Charles IX. of France, was read '*Je charme tout*' (I charm every one); the flatterers of James I. of England found in his name, James Stuart, 'a just master,' and proved his right to the British monarchy, as the descendant of the mythical King Arthur, from his name Charles James Stuart, which becomes 'Claims Arthur's Seat.' But perhaps the happiest of anagrams was that which failed to restore the sanity of Lady Eleanor Davies, the wife of Sir John Davies the poet. The poor lady was half-crazy, and she began to fancy herself a prophetess, because she discovered that from the letters of her own name could be read 'Reveal, O Daniel.' Political prophecy was a dangerous

game under Charles I., and at last she found herself arraigned before the Court of High Commission. Judge and bishop reasoned with her in vain, until the Dean of Arches laughed her out of court by finding also in her name, Dame Eleanor Davies, the unfortunate words, 'Never so mad a Ladie.'

Many of the pseudonyms adopted by authors have been merely transposed forms of their own names; thus Calvinus becomes 'Alcuinus;' François Rabelais, 'Alcofribas Nasier;' Bryan Waller Proctor, 'Barry Cornwall, poet.' The most famous name of this class, that of 'Voltaire,' was formed from 'Arouet, l. j.'—i.e. 'Arouet the younger.' See Wheatley, *On Anagrams* (1862).

Anahuac (a term signifying, in the old Mexican language, 'near the water'), the original name of the ancient kingdom of Mexico. It is now used to designate either the whole of the tableland of Mexico or certain portions thereof, more or less extensive, with the capital as a common centre. This plateau has a height of from 6000 to 8000 feet above the sea, and is generally level, though the great volcanoes of Jorullo and Popocatepetl rise out of it. The plateau, which comprises three-fifths of the republic of Mexico, is bounded east and west by the two great chains of the Cordilleras. The Anahualtecas are the Aztecs. See MEXICO.

An'akim, a people living in the south of Palestine, and especially about Hebron, then called Kirjath-arba. They are described in Scripture as a race of giants, and their name may come from a Hebrew root meaning strength or stature. They are also called 'Sons of Anak,' and were dispossessed by Joshua. See Num. xiii.

Analcite, or ANALCIME, a zeolite of composition $Na_2Al_2Si_4O_{12}\cdot 2H_2O$, found in pink or white pseudocubic crystals.

Anal Glands, pouches from the end of the intestine beside the anus. They occur especially in mammals, but also in snakes, lizards, and other reptiles, and in some invertebrates, such as insects, and consist of cells which exhibit a special development of the general glandular properties so abundantly associated with the skin. It is impossible to draw any hard and fast line between true anal glands and the numerous glandular pouches occurring in various parts of the body—e.g. head, back, groin, limbs, and external generative organs. The secretion of the glandular cells has usually a strong smell, and a fatty or oily composition. They are sometimes of protective advantage, and in other cases doubtless auxiliary to sexual attraction. See GLANDS, SKIN, MUSK GLANDS, BEAVER, CIVET, SKUNK.

An'alogue, a technical term in Biology, used to denote physiological, independent of morphological resemblance. Organs are *analogous* to one another, or are *analogues*, when they perform the same function, though they may be altogether different in structure; as the wings of a bird, and the wings of an insect. Organs, again, are *homologous*, or *homologues*, when they are constructed on the same plan, undergo a similar development, and bear the same relative position, and this independent of either form or function. Thus, the arms of a man and the wings of a bird are homologues of one another, while the wing of a bird and the wing of a bat are both anologous and homologous. See DARWINIAN THEORY, MORPHOLOGY.

Anal'ogy, a term, originally Greek, which signifies an agreement or correspondence in certain respects between things in other respects different. It makes a resemblance of relations, as in the phrase, 'Knowledge is to the mind what light is to the eye.' Euclid employed it to signify proportion, or the equality of ratios, and it has retained this sense in mathematics; but it is a term little used in the exact sciences, and of very frequent use in every other department of knowledge and of human affairs. In Grammar, we speak of the analogy of language—i.e. the correspondence of a word or phrase with the genius of the language, as learned from the manner in which its words and phrases are ordinarily formed. Analogy, in fact, supposes a rule inferred from observation of instances, and upon the application of which, in other instances not precisely, but in some respects, similar, we venture, with more or less confidence, according to the degree of ascertained similarity, and according to the extent of observation from which our knowledge of the rule has been derived. The opposite to analogy is *anomaly* (Gr., 'irregularity'); and this term is used not only in grammar, but with reference to objects of natural history which in any respect are exceptions to the ordinary rule of their class or kind. Here it strictly means the resemblance of function between organs which are essentially different (see ANALOGUE above).

In the progress of science, analogies have been discovered pervading all nature, and upon which conclusions are often based with great confidence and safety. It is a kind of presumptive reasoning from parallel cases that indeed warrants only probable conclusions; but the probability may become of a very high degree, and in the affairs of life we must often act upon conclusions thus attained. Reasoning from analogy, however, requires much caution in the reasoner. Yet even when its conclusions are very uncertain, they often serve to guide inquiry and lead to discovery. Many of the most brilliant discoveries recently made in natural science were the result of investigations thus directed. Where the proper evidence of truth is of another kind, arguments from analogy are often of great use for the removal of objections. It is thus that they are employed by Bishop Butler in his *Analogy of Religion, Natural and Revealed, to the Constitution and Course of Nature.* In law, reasoning from analogy must often, to a certain extent, be admitted in the application of statutes to particular cases. Upon similar reasoning the practice of medicine very much depends. To discover the meaning of any literary work, it is also often necessary; the sense of the author in a passage somewhat obscure being in some measure determined according to passages in which he has expressed himself more clearly. The application of this rule to the interpretation of Scripture is a point of difference between Protestants and Roman Catholics, the latter insisting upon the interpretation of difficult passages solely by ecclesiastical tradition and authority, while the former claim the right to apply analogy of interpretation. The inspiration of Scripture, however, when fully admitted, warrants a more confident use of analogical reasoning than in the case of the works of an uninspired author.

Anal'ysis (Gr., 'taking apart') and its converse *Synthesis* ('putting together') are now generally used to designate two complementary processes, the correlatives of each other, employed in chemistry, logic, mathematics, and philosophy. Analysis is the resolution of a whole into its component parts, the tracing of things to their source, and so discovering the general principles underlying individual phenomena; Synthesis is the explanation of certain phenomena by means of principles which are for this purpose assumed as established. Analysis, as the resolution of our experience into its original elements, is an artificial separation; while synthesis is an artificial reconstruction. We speak of an *analytic* method in science, and of a *synthetic* method; and both are necessary, the one coming to

the assistance of the other to secure against error, and promote the ascertainment of truth. The analytic method proceeds from the examination of facts to the determination of principles, from the individual to the universal; whilst the synthetic method proceeds to the determination of consequences from principles known or assumed, to the individual from the universal. It will thus be seen that they are really two necessary parts of the same method, and that, whereas the value of the synthesis depends on the accuracy of the analysis which has established the principle from which the synthesis sets out, so, on the other hand, an analysis which does not aspire to a synthesis, halts on the way. Synthesis without analysis gives a false science, since it is a pure imagination, based simply on hypothesis; and analysis without synthesis gives an incomplete science. The ideal of science and of philosophy can only be attained by a method which combines the two processes, and the test of the perfection of a theory is the harmony of the results obtained by them.

The part of Herbert Spencer's *Psychology* which he calls Special Analysis (following the preliminary General Analysis), has 'for its aim, to resolve each species of cognition into its components. Commencing with the most involved ones, it seeks by successive decompositions to reduce cognitions of every order to those of the simplest kind; and so, finally, to make apparent the common nature of all thought, and disclose its ultimate constituents;' while the synthesis describes the nature and genesis of the different modes of intelligence. In *Logic*, analysis is the division of a concept into the qualities or attributes of which it is constituted (see ABSTRACTION), whilst synthesis is the reverse process of adding together the qualities or attributes which determine a particular concrete. See GENERALISATION, INDUCTION, LOGIC, ALGEBRA, GEOMETRY.

In *Grammar*, analysis is a term much used since 1852 for the school exercise of distinguishing the different elements composing a sentence, or any part of it. It is allied to logical analysis, being a systematic resolution of the sentence into elements, performing different functions in the expression of thought, with definite relations to the whole sentence and to each other, as *subject* and *predicate*, with their respective *enlargements*. Dr Morell was one of the first of English grammarians to make a systematic use of this method in books for teaching.

Mathematical Analysis, in the modern sense of the term, is the method of treating all quantities as unknown numbers, and representing them for this purpose by symbols, such as letters, the relations subsisting among them being thus stated and subjected to further investigation. It is therefore the same thing with algebra in the widest sense of that term, although the term algebra is more strictly limited to what relates to equations, and thus denotes only the first part of analysis. The second part of it, or analysis more strictly so called, is divided into the Analysis of Finite Quantities, and the Analysis of Infinite Quantities. To the former, also called the Theory of Functions, belong the subjects of Series, Logarithms, Curves, &c. The Analysis of Infinites comprehends the Differential Calculus, the Integral Calculus, and the Calculus of Variations (see the several articles). To the diligent prosecution of mathematical analysis by minds of the greatest acuteness, is to be ascribed the great progress both of pure and applied mathematics within the last two centuries.

The analysis of the ancient mathematicians was a thing entirely different from this, and consisted simply in the application of the analytic method as opposed to the synthetic, to the solution of geometrical questions. That which was to be proved being in the first place assumed, an inquiry was instituted into those things upon which it depended, and thus the investigation proceeded, as it were, back, until something was reached which was already ascertained, and from which the new proposition might be seen by necessary consequence to flow. A reversal of the steps of the inquiry now gave the synthetical proof of the proposition. The modern mathematical analysis affords a much more easy and rapid means of solving geometrical questions; but the ancient analysis also afforded opportunity for the exercise of much acuteness, and was the chief instrument of the advancement of mathematical science until comparatively recent times. The invention of it is ascribed to Plato; but of the works of the ancients on geometrical analysis none are extant, except some portions of those of Euclid, Apollonius of Perga, and Archimedes.

Analysis, in Chemistry, is the term applied to that department of experimental science which has for its object the chemical disunion or separation of the constituents of a compound substance: thus, the resolution of water into its components hydrogen and oxygen; of common salt into chlorine and sodium; of marble into lime and carbonic acid; of rust into iron and oxygen; of sugar into carbon, hydrogen, and oxygen; and of chloroform into carbon, hydrogen, and chlorine—are all examples of chemical analysis. This department of chemistry, therefore, takes cognisance of the breaking down of the more complex or compound substances into their more simple and elementary constituents, and is antagonistic to *chemical synthesis*, which treats of the union of the more simple or elementary bodies to produce the more complex or compound. Chemical analysis is of two kinds: *Qualitative* analysis, which determines the quality or nature of the ingredients of a compound, without regard to the quantity of each which may be present; and *quantitative* analysis, which calls in the aid of the balance or measure, and estimates the exact proportion, by weight or volume, in which the several constituents are united. Thus, *qualitative* analysis informs us what water, marble, common salt, &c. are composed of; but it remains for *quantitative* analysis to tell us that water consists of 1 part of hydrogen by weight united with 8 parts of oxygen; that marble is composed of 56 parts of lime, and 44 of carbonic acid; common salt, of 35½ parts of chlorine, and 23 of sodium; turpentine, of 30 carbon, and 4 hydrogen; chloroform, of 12 carbon, 1 hydrogen, and 106½ chlorine.

The divisions of inorganic (mineral) chemistry and organic (vegetable and animal) chemistry have led to a corresponding classification of chemical analysis into *inorganic* analysis, comprehending the processes followed and the results obtained in the investigation of the atmosphere, water, soils, and rocks; and *organic* analysis, treating of the modes of isolation, and the nature, of the ingredients found in or derived from organised structures —viz. plants and animals. Both departments afford examples of what are called *proximate* and *ultimate* analysis. Proximate analysis is the resolution of a compound substance into components which are themselves compound: thus, in inorganic chemistry, marble is resolved into lime (calcium united with oxygen) and carbonic acid (carbon with oxygen); whilst ultimate analysis comprehends the disunion of a compound into its *elements* or the simplest forms of matter: thus, lime into calcium and oxygen; carbonic acid into carbon and oxygen; water into hydrogen and oxygen. Organic chemistry affords still better examples of each class: thus, ordinary wheat-flour, when subjected to proximate analysis, yields, as its proximate components, gluten (vegetable fibrin), albumen, starch, sugar, gum, oil, and saline matter;

but each of these proximate ingredients is in itself compound, and when they undergo ultimate analysis, the gluten and albumen yield, as their ultimate elements or constituents, carbon, hydrogen, oxygen, nitrogen, sulphur, and phosphorus; and the starch, sugar, gum, and oil are found built up of carbon, hydrogen, and oxygen.

Several other terms are in use in chemical treatises: thus, *Gas* analysis is applied to the processes employed in the examination of the various gases, and is every day becoming of more and more importance and interest. *Metallurgic* analysis includes the smelting of metallic ores, the assay of alloys of gold, silver, &c., and, in general, everything that pertains to the ultimate analysis of metallic ores and compounds. *Agricultural* analysis is restricted to the examination of manures, feeding-stuffs, and soils; *Medical* or *Physiological* analysis, to the investigation of blood, urine, and other animal fluids and juices, and the examination of medicinal compounds; whilst *Commercial* analysis is the term used where great accuracy or nicety of detail is not required in an analysis, but where the commercially important constituents alone are determined, as the separation and recording of the amount of phosphates, ammonia, and alkaline salts in a sample of guano; the total amount of saline matter in a certain water; the iron in an ironstone, the lime in a limestone, &c.

Generally speaking, there are three methods in use in analysis. These are the *Volumetric*, *Gravimetric*, and *Spectroscopic*. The *Volumetric* method submits the sample to certain characteristic reactions, employing as reagents liquids of known strength, called standard solutions; and by means of colour tests determines when a certain reaction is complete (see ALKALIMETRY). From the data thus obtained, it is possible to calculate the weight of substance present in the sample under examination. The *Gravimetric*, on the other hand, seeks to precipitate the metal or other substance in a convenient form for weighing, and makes constant use of the Balance. The *Spectroscopic* method depends on the separation of the different rays of light by means of a spectroscope (see SPECTRUM). The substance under examination is usually volatilised in the flame of a Bunsen burner; and when the spectroscope is applied, coloured lines, varying with different substances, are seen across the spectrum, and enable the analyst to detect the most minute proportions with certainty.

COMMERCIAL or PHARMACEUTICAL ANALYSIS differs from inorganic or organic analysis, pure and simple, in dealing usually with complex mixtures, to which it is impossible to apply tests having a definite value as to the information they afford. Thus, a mixture of various inorganic salts can be analysed with certainty by proceeding on well-known rules; but, as yet, no one can be confident in the analysis of an unknown mixture containing, perchance, sirups or tinctures, along with infusions of animal or vegetable origin. To such a mixture it is necessary to apply many physical processes, in the hope that these will so separate the constituents as to render it possible to recognise them either by appearance, odour, or specific test. Thus it comes about that a knowledge of experimental physics, no less than of chemistry, is essential to the successful analyst. In the following paragraphs it is proposed to indicate the physical processes which let the most light into the darkness of an unknown commercial mixture, but for details the reader must consult a practical treatise.

Distillation.—The mixture being placed in a glass flask furnished with a thermometer, heat is applied, and the boiling-point noted. If this gradually rises, it indicates that the mixture contains more than one volatile liquid; and by separating the various portions of distillate, according to the temperature at which they pass over, it is often possible to obtain the samples sufficiently pure to be recognised. The term *fractionation* or *fractional distillation* is applied to this method. If a non-volatile residue remains in the flask, it must be examined from other points of view. Thus, substances may be divided into: (1) Volatile—e.g. alcohol, ether, &c.; (2) Not volatile except along with other bodies—e.g. glycerine, which cannot be distilled alone, but passes over along with water vapour; (3) Non-volatile—e.g. fixed oils, olive, rape, &c.

Solution.—This may be applied in two ways. The solvent, be it alcohol, ether, water, or other liquid, is shaken with the substance under examination, and in many cases dissolves one ingredient, to the exclusion of others. Thus, it is desired to know how much oxide of iron is present in a sample of polishing-paste. Treatment with ether dissolves the fatty substances, and leaves the oxide free to be estimated in the usual manner. The other way consists in shaking ether or chloroform with the watery solution of the substance, when it will be found that some of the ingredients (more soluble in these liquids than in water) have been dissolved, and may be obtained on evaporation.

Rotation of the Polarised Ray.—It is found that many substances, and even the solutions of optically active compounds, have the power of rotating the plane of polarisation of a ray of light, and in many cases the extent of this rotation is sufficient to detect not only the presence but even the proportions of the substance to which it is due. Such bodies as sugar, turpentine, alkaloids, camphor, albumen, &c. exert this power.

Fluorescence (q.v.) is often of great assistance in commercial analysis. Thus, it is possible to pronounce the intense bitterness of a sirup to be due not to quinine, but to some other bitter, if no fluorescence is apparent; while the green fluorescence often noted on pens is a clear indication that the ink employed contains some colouring matter other than indigo, probably an aniline dye.

Melting and Solidifying Point.—The knowledge of this is of much importance, as, for example, in a case where common or other resins had been mixed with small pieces of amber. In such a case, the more fusible resin would melt and run away, leaving the bodies of higher melting-point. In other cases where no separation takes place, as with various kinds of wax, it enables the presence of paraffin or other foreign bodies to be detected. Adulteration of essential and fixed oils may frequently be exposed by this simple test.

Ignition on a piece of platinum or a porcelain dish is the simplest method of removing organic matter from inorganic, the latter usually remaining behind as a residue.

The specific gravity, the colour, odour, taste, crystalline form, solvent powers, and inflammability are all important factors in commercial analysis; while even such an apparently simple property as the size of drop which falls from a vessel containing the liquid, is in some cases the crucial test which decides as to the purity or otherwise.

The *spectroscope* is a powerful instrument, especially in pharmaceutical analysis. When a glass vessel, containing a tincture of a drug, is examined through the spectroscope, absorption spectra are seen (see SPECTRUM), and as these are characteristic of various herbs, they have been much used in recognising their presence in mixtures.

Sublimation.—When very carefully heated under a watch-glass, many alkaloids and other active principles yield sublimates having a characteristic crystalline form, which is easily recognised when examined under the microscope.

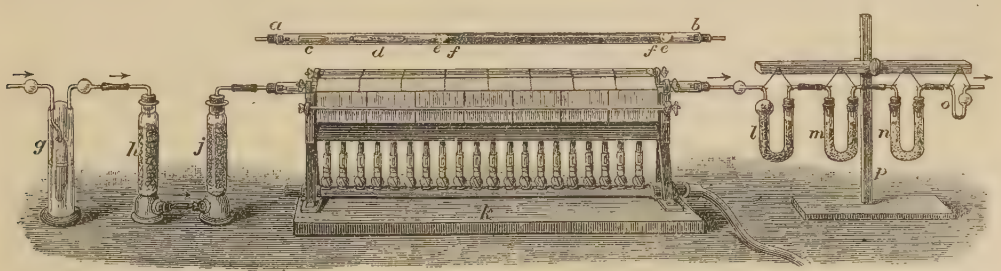
Microscopical Examination is a *sine quâ non* when flour, or indeed any organic powder, is in question. Under the microscope, the different forms of starch are easily recognised, and by counting the granules of each variety in the visible field, one can arrive at the approximate proportions of each that are present.

Such, then, are some of the most valuable methods of commercial analysis; and in the examination of an unknown substance, many or all of them must be tried, the ingenuity of the chemist having here unbounded scope. For instance, supposing a mixture contained olive-oil, chloroform, glycerine, alcohol, and flour, the following course (capable of infinite variation) would soon lead to the detection of its ingredients. The microscope would at once pronounce as to the name of the starch, and after filtration through paper, the liquid being placed in a flask and heated, the chloroform and alcohol would pass over into the receiver. The residue of glycerine and olive-oil being non-miscible, could be readily separated into its two constituents, each of which could be recognised by specific gravity, taste, or solubility, as well as other more chemical tests. The chloroform and alcohol, on being poured into water, would at once separate into two layers, the lower of chloroform with a trace of alcohol, the upper of water and alcohol with a trace of chloroform. Numerous precautions are of course necessary to make sure that no substance remains undetected, and in many cases the chemist tries to re-combine his mixture from the separate pure ingredients, so as to give greater certainty to his conclusions. Such a method is called the *synthetic* one. See ADULTERATION.

ORGANIC ANALYSIS.—The analysis of that class of substances commonly known as organic compounds, is a process which requires to be varied very considerably, according to the nature of the compound to be analysed, and according to the elements which it contains. Every so-called organic compound contains carbon as one of its essential constituents, but no sharp distinction, except of a purely artificial kind, can be drawn between organic and inorganic carbon compounds. Those elements which, besides carbon, are pre-eminently conspicuous in the composition of the majority of undoubtedly organic compounds, are hydrogen, oxygen, and nitrogen. Many hundreds of compounds exist which contain only carbon and hydrogen; some very large classes of compounds contain oxygen in addition to these two; while compounds containing nitrogen, in addition to hydrogen, or oxygen, or both, are also very numerous. Besides these large classes, however, many organic compounds exist, containing sulphur, phosphorus, chlorine, bromine, iodine, or other non-metallic element, or almost any of the known metals.

When a new compound has been isolated in what is believed to be a pure state, it is of the utmost importance, from a chemical point of view, that its qualitative and quantitative composition should be determined. From its origin, it is often possible to say what elements it is likely or unlikely to contain, but a qualitative search must be made to prove the presence or absence of particular elements. In order to test for carbon, and simultaneously for hydrogen, the substance is mixed with black oxide of copper (cupric oxide), which, as well as the substance itself, must be quite free from moisture, and then heated to redness in a hard glass tube. Carbon is oxidised, by the oxygen of the cupric oxide, to carbonic acid, which may be recognised by passing it through a small bent tube, containing in the bend a few drops of lime-water, when a white precipitate of calcium carbonate is produced; hydrogen is also oxidised, forming water, drops of which will condense in a cold glass tube placed in front of the one containing the lime-water. The test usually employed in searching for nitrogen, is to heat a small quantity of the substance with a fragment of sodium in a narrow glass tube, then to grind up the tube and its contents under water, and to seek in the solution thus obtained for the presence of sodium cyanide. The presence of oxygen may be ascertained by heating the substance to be tested, to a red heat in a current of pure and dry hydrogen gas, and observing the formation of water. The methods of testing for other elements cannot be discussed at length, but the general rule is to destroy the organic matter, either by heating alone, or by the action of powerful oxidising agents, such as nitric acid, and then to test by suitable means, as in inorganic analysis, for the products formed by such heating or oxidation.

The simplest case of the quantitative analysis of an organic compound is that when the compound contains carbon and hydrogen only, or these two along with oxygen. In such a case, the method almost universally adopted now is what is known as the *open tube combustion* method, or the combustion of the substance in a tube containing red-hot cupric oxide, through which a current of air or oxygen is passed during the operation. For the purpose of such a combustion, a tube of highly infusible glass is employed, some thirty inches long, open at both ends, and having an internal bore of about half an inch. This tube is filled, from the middle to within two inches or so of one end, with coarsely powdered cupric oxide, which is held in its place by two plugs of not too tightly packed asbestos. The ends are fitted with



Apparatus fitted for an Open Tube Combustion:

ab is the combustion tube shown separately, the ends being fitted with rubber stoppers, bored for the introduction of glass tubes; *ff* is cupric oxide confined by stoppers of asbestos at *ee*; *d* is the 'boat' to contain the substance, and *c* a piece of glass to narrow the air passage and prevent backward diffusion; *k* is the gas furnace; *g*, *h*, and *j* contain solution of caustic potash, pieces of solid caustic potash, and pumice-stone soaked in sulphuric acid respectively, to purify and dry the current of air; the stand *p* supports the tubes *l*, *m*, and *n*, which absorb the products of the combustion; *o* contains a drop of strong sulphuric acid, and serves to indicate the rate of exit of gas bubbles.

stoppers of red rubber, perforated so as to admit of the introduction of narrow glass tubes. Thus arranged, the tube is placed horizontally, with the ends projecting about two inches at each side, in a gas furnace (which is the modern representative of the old charcoal furnace at one time exclusively used), and carefully heated up to bright redness, while a current of dry air or oxygen is passed slowly through it, entering at the end which is not occupied by the cupric oxide, and passing out again at the other end. This preliminary ignition is to remove all traces of organic matter and moisture from the tube itself, and its contents, and it is continued for half an hour or longer. The current of air or oxygen is purified from traces of carbonic acid, and from aqueous vapour, by passing it first through strong solution of caustic potash contained in a washing-bottle, next through a tube containing pieces of solid caustic potash, and finally through one or more tubes containing fragments of pumice moistened with strong sulphuric acid. When the ignition has been continued for a sufficiently long time, part of the gas is turned out, so as to allow the front part of the tube to cool, the cupric oxide, however, being kept hot. After this, the *weighed* tubes, which are to collect the products of the combustion, are fitted air-tight to the exit end of the combustion tube. These consist of, first, a U tube of special shape, packed with fragments of pumice moistened with strong sulphuric acid, in which the whole of the water is condensed and collected; and second, one or more U tubes containing granulated *soda-lime** in which carbonic acid is absorbed. Before escaping from the last soda-lime tube, the unabsorbed gases pass through a short layer of fragments of dried calcium chloride, to retain water vapour liberated by the action of carbonic acid on the soda-lime. When the front part of the tube is nearly cold, the india-rubber stopper is removed, the weighed quantity of the substance to be analysed, contained in a platinum or porcelain 'boat,' is introduced into the tube, and the stopper rapidly replaced. A slow current of dry air being again passed through the tube, the substance is then very slowly and cautiously heated, so as to cause it to burn slowly; and, by degrees, the whole of the cool part of the tube is heated, eventually to bright redness, and this heat is maintained until the substance is completely burned, oxygen being passed through to complete the process if necessary. The products of combustion are entirely swept out of the combustion tube, and into the weighed tubes, by continuing the air-current for some time after the substance is entirely burned. These tubes are then detached, allowed to cool, and weighed. The percentages of hydrogen and carbon in the substance are calculated from the weights of water and carbonic acid respectively obtained.

As a rule, the percentage of oxygen contained in an organic substance is estimated by difference. Several methods for the direct determination of oxygen have been proposed, but none of these have come into common use.

Nitrogen is determined either by converting it into ammonia and ascertaining the quantity of this which is produced, or (when the nature of the substance to be analysed requires it) by carrying out a combustion of a special kind, with cupric oxide in a tube closed at one end, measuring the volume of the nitrogen which is obtained, and, by aid of a simple formula, calculating its weight. The conversion into ammonia is effected either by heating the substance to redness with soda-lime or by first boiling it with sulphuric acid and then boiling the ammonium sulphate so formed with excess of caustic alkali; but these methods are not applicable to all substances, and hence the combustion method must often be employed.

The methods employed to determine the quantities of elements less frequently occurring as constituents of organic compounds, such as sulphur, phosphorus, iodine, &c., are very numerous, and some are very complicated; hence they could not profitably be discussed here in any detail. Suffice it to say, as has been said already under the qualitative testing, that the first step is almost invariably one involving the destruction of the organic compound as such, by some oxidising process, after which the products can be treated exactly as would be done in the case of inorganic quantitative analysis.

Analysis, SPECTRUM. See SPECTRUM.

Analyst, PUBLIC. In the Sale of Food and Drugs Act (1875), it is enacted that certain specified local authorities may appoint one or more persons possessing competent knowledge, skill, and experience, as analysts of all articles of food and drugs sold within their district. The amending Act of 1899 deals chiefly with agricultural products, but gives power to the Local Government Board or the Board of Agriculture to put the Acts in force in any case where the local authority neglects to appoint a public analyst.

In section 12 of the Act, it is enacted that any purchaser of an article of food or drug in any place where there is an analyst, shall be entitled, on payment to such analyst of a sum not exceeding 10s. 6d., to have such article analysed by such analyst, and to receive from him a certificate of the result. Private individuals are generally content merely to receive the certificate, and rarely if ever take any further action. In order, therefore, that the Act should not become inoperative, and that dealers guilty of selling adulterated food might be tried and punished for the offence, inspectors were appointed, whose duty consists in going to the various shops and other places where food is sold, making purchases of the different articles therein exposed for sale, and submitting these to the public analyst for examination. If the analyst certifies that any of the substances submitted to him have been adulterated, the inspector must take steps to have the seller prosecuted. A case is prepared for trial, and if the judge is satisfied that an offence within the meaning of the Act has been committed, he convicts the accused, who is then liable in a penalty not exceeding, for a first offence, £20; second, £50; third or subsequent, £100. The existence of these functionaries, however, does not prevent any member of the public from purchasing any article of food and submitting it for analysis to the public analyst. Only, if it is intended to take legal action, he must, after the material has been bought and paid for, and is in the buyer's possession, intimate to the seller that it has been bought for the purpose of being analysed, and he must offer to divide it. If his offer is accepted, he must then and there divide it into three portions, each of which must be sealed in the seller's presence. One of the portions so sealed is to be left with the seller, so that he may, if he be so advised, have an analysis made of it on his own account. Another portion is to be taken to the public analyst for analysis, and the third is to be retained intact till after the trial, in order that the judge may, if he deems such a course advisable, direct that it be sent for analysis to the government analysts at Somerset House. In the event of the seller not accepting the offer of the buyer to divide the material, the buyer must then carry the whole to the analyst, who will divide it into two portions, one of which

* Soda-lime is a mixture of sodium and calcium hydrates, prepared by slaking quicklime with caustic soda solution, and drying up the product.

he will retain, the other he will seal and return to the buyer.

Although public analysts are appointed in the first place by local authority, their appointment is not legal until it has been confirmed by one of his Majesty's principal secretaries of state; and an analyst, when once appointed, cannot be removed without a like sanction from one of these officials. See ADULTERATION.

Anam. See ANNAM.

Anamirta. See COCCULUS INDICUS.

Anamne'sis (Gr., 'recollection'), specifically, recollection of a state of Pre-existence (q.v.; and see PLATO); also a patient's remembrance of the first symptoms of his illness.

Ana'nas. See PINE-APPLE.

Ananiev, a town of Ukraine, in the government of Kherson, 100 miles N. of Odessa; pop. 20,000.

Anapa, a Black Sea Kuban port, 50 miles SE. of Yenikale; pop. 8000.

Anaphylaxis, a phenomenon of serum-therapy, arising when an animal has had a considerable quantity of a serum injected. Such an animal, afterwards receiving a much smaller quantity, sometimes dies, as if the previous injection, so far from producing immunity, had rendered it more sensitive to the poison.

Anarchism (Gr. *an-*, 'not,' and *archē*, 'rule') properly means the negation of government, and has quite a distinct meaning from *Anarchy* in the usual acceptation of the word. In its ordinary sense, anarchy is a state of society without any regular government, when social and political confusion prevails. *Anarchism*, on the other hand, is the name adopted by a phase of revolutionary theory. The acknowledged father of anarchism is Proudhon. Proudhon was an eccentric and paradoxical thinker, with a passionate and exaggerated love of individual freedom. Government of man by man he considered to be oppression, an interference with freedom. He therefore regarded a form of society without government, in which every man should be a law to himself, as the goal of human evolution. Since Proudhon, the most prominent expounder of the anarchist theory has been the Russian Bakunin (q.v.), who, in various writings, and by an active propaganda, diffused it in most of the Latin countries. His ideas may be traced in the Paris Commune, in Spain during the risings of 1873, in Italy, and in French Switzerland. Well-known representatives of it are the Russian man of science, Prince Kropotkin, and the distinguished French geographer, Élisée Reclus, At the anarchist trial at Lyons in 1883 the accused, including Kropotkin, drew up a declaration which may be regarded as the most important statement of their position.

It is not easy to define the anarchist views, but the following are undoubtedly the leading points: They desire complete liberty for all men. They object to all authority, whether monarchic or republican, whether based on divine right or universal suffrage, for history teaches that all government tends to privilege and oppression. In all human relations their ideal is one of free contract, perpetually subject to revision and cancelment. But such an ideal of freedom cannot be realised in a society where land and capital are the monopoly of a class. Land and capital must therefore be the common property of society, at the disposal of every one. They wish equality, equality of fact, as a corollary, or rather fundamental condition, of liberty; that all men may have daily bread, knowledge and work, independence and justice. As the essential means for bringing about this new evolution of society, they insist on the universal diffusion of knowledge. When natural laws shall have been understood, and the knowledge of them universally diffused among men, there will be no need for external authority. Natural laws being recognised by every man for himself, he cannot but obey them, for they are the laws also of his own nature; and the need for political organisation and administration will at once disappear. With reference to the old system of society which stands in the way of the new era, Bakunin recommends a most unsparing policy of destruction. As the theory of anarchism is unlimited freedom and the negation of government, it is difficult to realise how society in its wider aspects can be carried on in consistency with it. Anarchists, however, seem to agree in believing that the free commune or free association will be the fundamental form of society; and there will be a free federation of free associations, leading to the universal and international solidarity of the workers of all countries, and transcending all the limits and obstacles raised by so-called patriotism and national jealousy. Society will be a free grouping of peoples in accordance with natural needs freely realised. But the future form of society is the work of coming generations, and will proceed out of the movement and life of the people. The work of the present is the removal of the old, and the universal diffusion of true science among the masses. It will be seen that anarchism has two aspects: it has a political theory, the negation of government or of external authority; and it has an economic theory as to land and capital, which is common to it with socialism. It has also come to have another aspect—that with which it is now usually identified—war on human society as at present constituted, hatred of the *bourgeois* and propertied classes as such, and a systematic effort to establish, especially by means of explosives, a terrorism such as was formerly associated with extreme Russian Nihilism (q.v.), and the Irish dynamiters' attempts. Notable outbreaks have been those at Chicago (q.v.) in 1886; in Spain and in France in 1892 (especially those for which Ravachol was responsible); in the Barcelona theatre in 1893; in the French Chamber of Deputies (Vaillant, 1893); in a Parisian café (Henri, 1894); the destruction of Bourdin by his own petard at Greenwich (1894). Anarchist daggers cut short the lives of President Carnot (1894) and the Empress of Austria (1898). In 1900 King Humbert of Italy was shot by an anarchist, and in 1901 President McKinley. On the other hand, Tolstoi, who taught non-resistance to evil, was an anarchist.

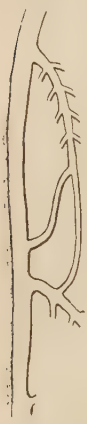
See SOCIALISM, DYNAMITE, NIHILISM; several works by Kropotkin; American books by Schaack, Parsons, Lum, and Mackay (1889–94); Felix Dubois, *Le Péril Anarchiste* (1893; trans. 1894); Zenker, *Der Anarchismus* (1895; trans. 1898)); Vizetelly, *The Anarchists* (1912).

Anas. See DUCK.

Anastasius, the name of four popes, the first and most eminent of whom held that office for only three years (398–401).—For the Emperor Anastasius I. (491–518), see BYZANTINE EMPIRE. Anastasius II. (713–715), deposed by his soldiers, retired to a cloister, and an attempt to recover his crown cost him his life.

Anastomosis, the union of the vessels which carry blood or other fluids; also the junction of nerves. The veins and absorbents anastomose to form large single trunks, as they approach their ultimate destinations. The arteries break up into small branches for the supply of the tissues, and each small vessel, again, communicates with others given off above and below. Round each large joint there is very free anastomosis, so that the safety of the limb beyond may not be

entirely dependent on the single arterial trunk passing into it, exposed as it is to all the obstructive influences of the different movements of the joint. If the main artery is permanently obstructed, the anastomosing vessels enlarge, so as to compensate for the loss; but after a time only those whose course most resembles the parent trunk continue enlarged, and the others gradually regain their ordinary dimensions.



Arteries anastomosing.

An idea of the profusion of this anastomosing system may be formed from the fact that if the innominate artery (or great vessel destined for the supply of the right upper half of the body) be tied, and those on the left side injected with size and vermilion, the injection will flow freely into the arteries of the right arm, through branches as minute as they are numerous.

Anath'ema (Gr. *anathēma*, 'a thing set up'), a word originally signifying some offering or gift to the gods, generally suspended in the temple. It also signifies a thing devoted; a thing devoted to destruction (the equivalent of the Hebrew *Cherem*); and was ultimately used in its strongest sense, implying perdition, as in Rom. ix. 3; Gal. i. 8, 9. In the Catholic Church, from the 9th century, a distinction has been made between excommunication and anathematising; the latter being the extreme form of denunciation against obstinate offenders. The first general council (Nice, 325 A.D.) anathematised those who held the Arian heresy. It thus declared that they were excluded from the communion of the church, and that if they persisted in their offence they must perish eternally (see EXCOMMUNICATION).—*Anathema Maranatha* (1 Cor. xvi. 22) is not, as commonly understood, a more fearful kind of curse; the Syriac words, *Maran athá* ('Our Lord cometh'), should, according to the best authorities, be read as a separate sentence, as in the Revised Version.

Anatolia, a Greek name for Asia Minor (q.v.). The word is derived from the Gr. *Anatŏlé*, 'the rising of the sun,' 'the east;' so that as a word it has the same meaning, though not the same application as the Italian *Levante*, used of all the countries lying east of the Mediterranean; and the same as *Orient*, derived from the Latin, used of the 'East' in the widest sense. From Anatolia is formed the Turkish *Anadŏli*, generally applied to the western and northern portions of Asia Minor.

Anatomy (Gr., 'a cutting up or dissecting') is the science of the form and structure of organised bodies, and is acquired practically by separation of the parts of a body, so as to show their distinct formation, and their relations to each other. It is therefore a branch of the science of Biology, which consists of two great divisions—the Anatomy of animals, styled *Zootomy*, and that of plants, *Phytotomy*. The various divisions of Anatomy will be found at the end of the following historical sketch.

History of Anatomy.—It is difficult to determine the date at which this science began to be cultivated, but it is probable that from the earliest times some persons took advantage of favourable circumstances to acquaint themselves with it. Alcmæon of Crotona, a disciple of Pythagoras, and Democritus are said to have dissected animals with the view of obtaining comparative knowledge of human anatomy. Hippocrates (q.v.), born at Cos about 460 B.C., though the father of medicine, is less justly regarded as the father of anatomy, as his views of the structure of the human body are very superficial and incorrect. Aristotle, born 384 B.C., is really the founder of the science. He seems to have based his systematic views of comparative anatomy on the dissection of animals, but does not appear to have dissected men. He first gave the name *aorta* to the great artery. No real progress in human anatomy was made, owing to the researches being confined to animals, till the time of Erasistratus (250 B.C.), who was the first to dissect human bodies—the bodies of criminals. Herophilus also is said to have dissected living subjects. Celsus (63 B.C.) in his *De Medicinâ* wrote much on anatomy.

Galen (131 A.D.) dissected apes, as being most like human subjects, though he occasionally obtained bodies of persons found murdered; and his writings show a knowledge of human anatomy. Soranus, Oribasius, Nemesius, Meletius, and Theophilus based their anatomical works mainly on Galen. Anatomy made small progress among the Arabs, as their religion prohibited contact with dead bodies. Avicenna (980 A.D.), born in the province of Khorassan, was a good osteologist, and described some structures not alluded to by Galen.

The medical school at Bologna became famous in the 13th century, as did also those at Padua and Salerno; but no very material progress was made in anatomy. Mondino, born at Milan, 1315, professed anatomy there, and is considered the real restorer of anatomy in Italy. Then came Guy de Chauliac, Mathæus de Gradibus (1480), Gabriel de Zerbis (1495), Achillini (1512), Berenger of Carpi (1578), Etienne, Massa, and Sylvius (1539). An epoch is made by Andrew Vesalius (q.v.), who published a great work on anatomy before he was 28 years of age.

William Horman of Salisbury wrote, in 1530, *Anatomia Corporis Humani*. Thomas Gemini of London, in 1545, engraved upon copper the anatomical figures of Vesalius, which had appeared in Germany upon wood. Gemini suppressed the name of Vesalius, though using his figures and descriptions. Thomas Vicary, in 1548, is said to be the first who wrote in English on anatomy; he published *The Englishman's Treasure, or the True Anatomy of Man's Body*. Franco (1556), Valverda, and Columbus wrote works of great merit on anatomy. In 1561 Gabriel Fallopius (q.v.) taught with great distinction at Padua, and made many original discoveries.

In the 17th century, progress was rapid. Harvey, in 1619, discovered the circulation of the blood, and the microscope was employed to detect the structure of minute vessels. Aselli, in 1622, discovered and demonstrated the existence of the lymph-vessels. The glandular organs were investigated by Wharton, while Malpighi, Swammerdam, and the illustrious Ruysch, by the use of injections and the aid of the microscope, gave a new impulse to research in the minute structures. Eminent names in the history of anatomy are numerous in the 18th century. In Italy, which still retained its former pre-eminence, we find Pacchioni, Valsalva, Morgagni, Santorini, Mascagni, and Cotunni; in France, Winslow, D'Aubenton, Lieutaud, Vicq d'Azyr, and Bichat, the founder of general anatomy; in Germany, Haller and Meckel prepared the way for greater achievements in the 19th century; in Great Britain, Cowper, Cheselden, Hunter, Cruikshank, Monro, and Charles Bell contributed to the progress of the science; while Holland was worthily represented by Boerhaave, Albinus, Camper, Sandifort, and Bonn. On the boundaries of the two centuries, we find the names of Sömmering, Loder, Blumenbach, Hildebrand, Reil, Tiedemann, and Seiler.

The necessity of a union of theory and practice

has led to the study of PATHOLOGICAL ANATOMY (the dissection and study of structures as modified by diseases). The origin of this branch of anatomy may be traced back to ancient times in Egypt; and amongst the Greeks some anatomico-pathological observations are found. During the general revival of science in the 16th century, many notices of pathological anatomy occur. Morgagni (1767) must, however, be regarded as the true founder of Pathological Anatomy. He was worthily followed by Lieutaud, Sandifort, Hunter, Baillie, Meckel the younger, and others. The recent change of direction given to the study of Pathological Anatomy, which is now properly regarded as a means towards practical improvements in medicine, must be ascribed to Bichat and the pupils of Broussais, among whom may be mentioned the names of Laennec, Cruveilhier, Louis, Andral, Lobstein, Lebert, Virchow, and Bennett.

Theoretical anatomy is divided into General and Special. GENERAL ANATOMY gives a description of the elementary tissues of which the systems and organs of the body are composed, as preliminary to an examination of them in their combined state in the various organs: it also investigates their laws of formation and combination, and the changes which they undergo in various stages of life. This branch of study may also be styled Structural or Analytical Anatomy, and has been first developed in recent times, especially by Bichât (1801) and Beclard, who have been followed by J. Müller, Goodsir, Henle, E. H. Weber, Schwann, Valentin, and many others. In our day, microscopic investigation has been successfully applied to the study of elementary textures. See HISTOLOGY.

SPECIAL ANATOMY (styled Descriptive by the French writers) treats of the several parts and organs of the body in respect to their form, structure, and systematic connection or relation with each other. The arrangement of the several parts and organs in an order deduced from their similarity in structure or use, constitutes SYSTEMATIC ANATOMY. According to this mode of study, which is essential as an introduction to physiology, anatomy has been divided, though not with scientific precision, into six branches of study. 1. *Osteology*, which treats of the bones, including the cartilages of the joints (chondrology). 2. *Arthrology*, which describes the ligaments, or bands, that unite the bones of various joints. The bones, with their cartilages and ligaments, form a framework, which supports the external soft parts, and within which the vital organs are suspended and protected from injury; they are also arranged in a mechanical system as organs of locomotion. 3. *Myology* explains the system of the muscles, which, by their contractile power, serve to impart motion to the bones and joints; while, like the bones, they contribute to form the cavities of the body, and to protect the internal organs. Their form also serves to produce the external shape and symmetry. 4. *Angeiology* describes the vessels or ducts, with their complex network and ramifications, spreading over most parts of the body, and divided into two great systems: (*a*) the blood-vessels with the heart, a fleshy organ propelling the blood through the pulsating vessels or arteries, from which it returns to the heart, after circulation through the veins; (*b*) the lymphatics, by means of which a certain fluid (lymph) is passed through a series of organs named lymphatic glands, and afterwards enters the large veins at the root of the neck. The lacteals, which absorb the chyle from the intestine, also belong to this system of vessels. 5. *Neurology*, or the doctrine of the nerves, describes the nervous system, as divided into, *first*, the two central masses of the brain and the spinal cord; *second*, the ramifications of nerves running from the brain and spinal cord to almost all points of the surface; and *lastly*, the order of nerves having a peculiar structure, and styled the ganglionic system of nerves. 6. *Splanchnology* describes the viscera or organs formed by combination of the distinct systems of veins, nerves, lymphatics, &c., and mostly situated in the cavities of the body. These are divided into five groups—viz.: (*a*) the organs of the senses—sight, hearing, smell, taste, and touch; (*b*) of voice and respiration—nostrils, mouth, larynx, trachea, and lungs, with the thyroid gland, the thymus gland, and the diaphragm; (*c*) digestive organs—the mouth, with its salivary glands, the throat, gullet, the stomach, the intestines, with the liver, spleen, and pancreas; (*d*) the urinary organs—kidneys, ureters, bladder, and urethra; (*e*) sexual organs of both sexes.

Special anatomy may be treated in another mode; by an arrangement made in accordance with natural divisions, or by imaginary lines dividing the body into several regions—as the head, the trunk, and the extremities. Again, the trunk may be subdivided into neck, thorax, and abdomen; and in each of the main regions, several subdivisions may be made. This system of arrangement may be styled Topographical Anatomy, and is also known as Surgical Anatomy, on account of its importance as the basis of operative surgery. It was the eldest of the Monros of Edinburgh University who first gave this branch of the study its due prominence.

COMPARATIVE ANATOMY, the investigation and comparison of the structures of two or more animals, has always preceded anthropotomy, or dissection of the human subject, but was first treated systematically as a distinct science by Cuvier and his pupil, Meckel the younger. Blumenbach, Tiedemann, Home, Blainville, Geoffroy St Hilaire, Carus, Oken, Goethe, Owen, Goodsir, Müller, Wagner, Siebold, Bowman, Todd, Milne-Edwards, Von Baer, Gegenbaur, Kölliker, Remak, Czermak, Leydig, Frey, Schwann, Haeckel, Kovalevsky, Agassiz, Van Beneden, Burmeister, Carpenter, Allman, Sharpey, Allen Thomson, Huxley, Turner, and Flower, may be named as eminent contributors to this branch of science.

ANATOMY FOR ARTISTS is studied with reference to the effects produced by internal structure on the external form, and describes the organs, especially the muscles and tendons, not only in a state of rest, but also as modified by passion, action, and posture.

PRACTICAL ANATOMY includes *Dissection* (q.v.) and the making of *Preparations*. *Preparation* consists in dividing parts or organs, so that their respective forms and positions may be clearly shown. Organs or parts thus treated are styled *Anatomical Preparations* of bones, muscles, vessels, nerves, &c. For example, a bone-preparation is made by clearing away all muscular and other adhesions; the whole structure of the bones, thus prepared and bleached, when connected by wires in its natural order, forms an artificial *skeleton*. Preparations of the soft parts are either dried and varnished or preserved in spirit.

A series of such specimens, arranged in proper order, forms an *Anatomical Museum*. The valuable collections made by Ruysch, Rau, Loder, Walter, John and William Hunter, Meckel, Sömmering, Dupuytren, and Goodsir, are all now public property. As it is impossible to preserve thus all parts in their integrity for any great length of time, artificial copies in wood, ivory, papier-mâché, and wax are made with great exactitude. But, apart from dissections and preparations of the natural organs, the most general and available assistance in the study of anatomy is found in anatomical engravings and plates on wood and

copper. This assistance was known in ancient times. Aristotle affixed to his works on anatomy some anatomical drawings, which have been lost. In the 16th century the greatest artists—Leonardo da Vinci, Michelangelo, Raphael, Titian, and Dürer—gave their aid in designing anatomical figures. See the writings on anatomy of Meckel, Cruveilhier, Hyrtl, Rauber, Bardeleben, Tillaux, Poirier, Testut; in Comparative Anatomy, Carus, Wagner, Cuvier, Gegenbaur, Milne-Edwards, Owen, Huxley. Among English works may be mentioned those by Lizars, Jones, Cooper, Richard Quain, Ellis, Ford, Gray, Morris, Treves, Cunningham, and Symington, in Special Anatomy; by Morton and Maclise, in Surgical Anatomy; and by Baillie and Bright, in Pathological Anatomy.

The anatomy of the various parts and organs of the body will be found described, frequently in conjunction with their physiology, under their proper heads. Among the more important articles are the following:

Abdomen.	Epidermis.	Larynx.	Peritoneum.
Aorta.	Eye.	Leg.	Placenta.
Arm.	Fœtus.	Liver.	Respiration.
Arteries.	Foot.	Lymphatics.	Ribs.
Bile.	Glands.	Man.	Shoulder.
Blood.	Hair.	Medicine.	Skeleton.
Bone.	Hand.	Muscle.	Skin.
Brain.	Heart.	Nervous System.	Skull.
Capillaries.	Hip-joint.	Nose.	Spinal Cord.
Cartilage.	Histology.	Ovariotomy.	Spleen.
Cells.	Horn.	Palate.	Teeth.
Circulation.	Joints.	Pancreas.	Tongue.
Digestion.	Kidneys.	Pelvis.	Trachea.
Ear.	Knee.	Pericardium.	Veins.

Anatomy, in Law. The difficulty of obtaining a sufficient supply of human bodies for dissection for purposes of surgical and medical instruction, gave rise, in the beginning of the 19th century, to the Resurrectionists (q.v.), and to the horrible crimes for which Burke was executed in 1829. This matter was accordingly made the subject of statutory legislation, and is now governed by the Anatomy Acts of 1832 and 1871. These Acts authorise the Home Secretary to grant licenses to practise anatomical dissection to any qualified medical practitioner, or any teacher or student of anatomy. The supervision of places where anatomical examination is conducted is entrusted to inspectors of anatomy in the several districts, who make quarterly returns (unprinted) to the Home Office of the human subjects used in each district. In the absence of a contrary wish expressed by the deceased or a surviving relative, the Acts authorised an executor to submit the body of the deceased to dissection, but where the deceased has directed this to be done, the Acts recognised the right of near relatives to object. Bodies are not to be removed for examination until forty-eight hours after death, nor without a certificate by the medical attendant, stating, according to the best of his knowledge or belief, the manner or cause of death. The person receiving the body must intimate the fact to the inspector, and must afterwards send to him a certificate of decent burial. The period of time within which such certificate of burial must be sent is fixed by statutory order (Anatomy Orders, 1916). The Acts do not apply to any post-mortem examination of any human body required or directed to be made by any competent legal authority.

Anatta. See ANNATTO.

Anaxag'oras, one of the most eminent Ionic philosophers, was born at Clazomenæ, in Ionia, 500 B.C. He belonged to a wealthy family, but devoted himself exclusively to intellectual pursuits; and, still young, moved to Athens, where, in the course of a thirty years' sojourn, he acquired a high reputation, and had many illustrious pupils, among whom were Pericles, Euripides, and possibly Socrates. But at last, his explanations of physical phenomena by natural causes rendered him suspicious to the polytheists; he opposed divination and astrology; and, being accused of impiety towards the gods, he was condemned to death. His sentence, however, was commuted into banishment for life, through the eloquence of Pericles. He withdrew to Lampsacus, on the Hellespont, where he died in 428.

It is not easy to ascertain what were the opinions of Anaxagoras in philosophy. Fragments merely of his works have been preserved, and even these are sometimes contradictory. Of one thing we are certain, that he had a deeper knowledge of physical laws than any of his predecessors or contemporaries. He also arrived at some tolerably accurate conclusions regarding the cause of the moon's light, of eclipses, earthquakes, meteors, of the rainbow, of wind, and of sound. His great contribution to ancient philosophy, however, was his doctrine as to the origin of all things. He held that all matter existed originally not in the form of the so-called elements, but in the condition of atoms; that these atoms, infinitely numerous and infinitesimally small, had existed from all eternity, and that order was first produced out of this infinite chaos of minutiæ through the influence and operation of an eternal intelligence (Gr. *nous*). He also maintained that all bodies were simply aggregations of these atoms, and that a bar of gold, or iron, or copper was composed of inconceivably minute particles of the same material; but he did not allow that objects had taken their shape through accident or blind fate, but through the agency of this 'shaping spirit' or Nous, which he described as infinite, self-potent, and unmixed with anything else. 'Nous,' he again says, 'is the most pure and subtle of all things, and has all knowledge about all things, and infinite power.' His theory of the Nous was vague, but makes a great advance in the direction of theism, though personality is not attributed to the Nous. Anaxagoras marks a great turning-point in the history of speculation: while, on the one hand, his doctrine of the Nous passed to Aristotle, his doctrine of atoms prepared the way for Democritus (q.v.) and the Atomic School. With Anaxagoras, too, philosophy left its old home in Ionia, and established itself in its most famous seat—in Athens. His most notable work, *On Nature*, has survived only in fragments. See Zeller or Burnet (1892) on early Greek philosophy.

Anaximander, a Greek mathematician and philosopher, successor of Thales as head of the physical school of philosophy, was born at Miletus, 611 B.C., and died in 547. He is said to have discovered the obliquity of the ecliptic, and he certainly taught it. He appears to have applied the *gnomon*, or style set on a horizontal plane, to determine the solstices and equinoxes. The invention of geographical maps is also ascribed to him. As a philosopher, he speculated on the origin (*archē*) of the phenomenal world, and this principle he held to be the infinite or indeterminate (*to apeiron*). From it he conceived all opposites, such as hot and cold, dry and moist, to proceed through a perpetual motion, and to return to it again. Of the manner in which he imagined these opposites to be formed, and of his hypothesis concerning the formation of the heavenly bodies from them, we have no sufficient information. Some of his particular opinions were, that the sun is in the highest region of the heavens, is in circumference twenty-eight times greater than the earth, and resembles a cylinder from which flow continual streams of fire; also that the earth is of the form of a cylinder, that it floats in the midst of the universe, and that it was formed by the drying up of moisture by the sun.

Anaxim'enes, a Greek philosopher of the Ionic school, was born at Miletus, and died about 500 B.C. He held *air* to be the first cause of all things, or the primary form of matter, whence all things were formed by compression.

Anaximenes, a Greek historian, rhetorician, and epic poet, born at Lampsacus, accompanied Alexander in Persia, and was probably the author of the *Rhetorica ad Alexandrum* attributed to Aristotle.

Anbury is a disease in the turnip, which is produced by a fungus Plasmodiophora, belonging to the family of slime-fungi, Myxomycetes. It attacks the plant most readily when its full vigour is restricted by some unfavourable condition of growth, such as when it is planted too frequently on the same land; when the soil is deficient in some necessary ingredient; or when it is in an unsuitable mechanical condition, the result frequently of improper or unseasonable cultivation. It is identical with club-root in cabbages. It is commonly termed *finger-and-toe*, but this name is also applied to another condition in turnips in which the bulb branches out into numerous tap-roots, the skin remaining whole. Anbury produces a scabbed and broken condition of the skin, and tubercular enlargements on the roots at the base of the bulb. Both affections may exist on the same plant. Anbury frequently causes almost complete failure of the crop. In some cases maggots are found in the affected parts, but they are only attracted by the degenerate structure, and have nothing to do with the disease. It is accompanied with an offensive smell, resulting from the decay of the injured parts. Anbury may be noticed at a distance by the drooping and unhealthy appearance of the leaves during sunshine. There is no cure, but preventive means may be successfully employed, such as planting turnips on the same land only after long intervals; avoiding treading of the land while it is wet; working the soil and planting good seed at the proper season; supplying manures sufficient to make good the soil's deficiencies; avoiding the consumption by cattle of roots on land which is soon to grow turnips; also dressing land with lime, preferably a year or more before the crop is to be sown. The first dressing is not always efficacious, but a second application at the same period of the rotation when it comes round again is usually successful. The workings of the disease are yet so far mysterious: although the fungus is known, the actual conditions which encourage its development are not fully understood. For instance, in some districts (parts of Gloucester, and East Barns, Dunbar) turnips can be grown year after year on the same land, and yet not take the disease; while in other places (light soils particularly), to repeat the crop oftener than once in five or six years is most dangerous.

Ancelot, JACQUES-ARSÈNE-POLYCARPE-FRANÇOIS, a French dramatic poet, was born at Havre, February 9, 1794. His first success was the tragedy of *Louis IX.* (1819), which procured him the post of librarian at the Arsenal, and a pension from the king. In 1826 he accompanied Marshal Marmont to St Petersburg, and published next year his *Six Mois en Russie*, part in verse, and the novel, *L'Homme du Monde*. After the revolution of July had deprived him of his place and pension, he brought out upon the stage a succession of little comedies and vaudevilles, most of which had but little merit. His tragedy *Maria Padilla* opened to him, in 1841, the doors of the French Academy. Shortly after appeared his *Épîtres Familières*, distinguished by point and elegance. He died 7th September 1854.

Ancestors, WORSHIP OF, the chief element in the religions of perhaps the larger half of mankind at the present moment. It arises naturally from the primitive conception of a soul during life animating the body and exercising influence over it, and after death merely retaining its power, continuing into the unseen world the life and social relations of the living world. The dead chief now passes into a deity, goes on protecting his clan and receiving service from them, and continues to keep the same temper as in mortal life. So that it is not only family affection, but also actual fear, that impels this reverence among the North American Indians, the ancient Aztecs, the negroes in Guinea, the natives of Polynesia, and most strongly among the Zulus, who conquer in battle with the help of the 'amatongo,' the spirits of their ancestors, and reach back through a series of divine ancestors to the earliest ancestor and creator of man, the Old-old-one, Unkulunkulu. The primitive mind, it would seem, makes no essential distinction between the divine nature, the human nature, and the animal nature, and freely worships visible natural objects for the sake of the spirits resident in them. The conception is due to Animism (q.v.), and develops into a more spiritual point of view, in which the indwelling spirit is considered as having an independent existence detached from the object with which it was confounded.

The worship of ancestors is really a subdivision of animism. The spirits of the dead are assimilated to the spirits that reside in the objects of nature, at first revered like them, then more than they. Where direct worship of the objects of nature unfolds itself into a rich dramatised mythology, that is to say among the races most endowed with the speculative and æsthetic faculties, such as the ancient Greeks, animism and the worship of ancestors develop but feebly. But where on the contrary, as in China, mythology remains infertile; or where, as among many savage races, it never gets beyond its embryonic stage, animism becomes preponderant, and often, by it and along with it, the worship of ancestors. In China it is the dominant religion. Ancestors still have their temples and their offerings, and remain so present that the virtues or the crimes of their descendants are always considered in relation to them, as covering them with honour or infamy. The Hindu pays his offerings to the *pitris* (*patres*) or divine manes, and looks to them for success and happiness. In Europe, the most conspicuous example was the usage of the ancient Romans. Their *manes* or ancestral deities were embodied as images, set up as household patrons, and appeased with offerings. They were counted among the gods of the lower world, and tombs were inscribed D.M., 'Diis Manibus,' sometimes seen as a strange survival in Christian epitaphs. And in the crowd of saints in modern Christendom, with specialised functions, deemed capable of interfering to help the spiritual interests of their votaries, we see at least with what marvellous tact new ideas were fitted to the old.

The universality of ancestor-worship led Herbert Spencer to the opinion that it was the origin of religion everywhere. His view is a kind of revival of the old Euhemerism (q.v.), which explained the myth as containing an element of historical truth, its figures as enlarged portraits of real men and women, and its gods as merely ancestral ghosts raised to a higher power. He argues that all religious beliefs arose originally out of the erroneous conclusions drawn by primitive man from the ill-understood facts of his own nature, especially in the phenomena of sleep and dreams. These have to the savage as much objective reality as what he has seen when awake. This primitive conception finds further support in the facts of syncope, apoplexy, catalepsy, and other forms of temporary insensibility. During these his 'double,' the soul, has, he believes, been actually

absent from the body. These ideas applied to death—but a lengthened sleep or prolonged absence—have engendered the idea of an awaking following regularly after death. Hence primitive funeral rites assume that the dead can eat, drink, and fight anew, and act in everything like a living man. Upon this conception of the state of the dead, in Spencer's view, the savage man's idea of another life is grafted, confirmed as its reality is by the apparition of the dead in dreams. A future life assumes another world—a region of souls, located at first near the place of burial, afterwards above, below, and around the living world. These disembodied souls constantly increasing in number are ordinarily invisible, but are able to manifest themselves from time to time, and to particular individuals. Hence arises naturally the idea that things astonishing, extraordinary, or exceptional, have for their causes the action of the dead spirits —invisible, and in one sense supernatural agents. Since these disembodied spirits still continue influential for good or evil, it is wise to conduct ourselves in such a way as to conciliate their good-will and to deprecate their wrath.

Mr W. J. Perry enunciates the general theorem 'that cults of gods are only carried on by their descendants,' and claims to have established it for certain communities in *The Megalithic Culture of Indonesia* (1918). Wherever the 'Children of the Sun' went, they acted as priests of the Sun-cult (q.v.). The king was regarded as a son of the god, 'Therefore the cult of the gods of Egypt was an ancestor-cult in the royal family. In the tomb the ancestors of each man received the funerary cults of their sons; in the temples the gods received the divine cult at the hands of their sons, the kings' (*Children of the Sun*, 1923, p. 179). The state cult being primarily an affair of the rulers, concerned the common people but little. And so elsewhere wherever the 'archaic civilisation' came. Where the 'Children of the Sun' disappeared their cult disappeared too, though the people might continue to practise certain ceremonies connected with the sky-gods merely for the purpose of securing some utilitarian end. It is suggested that the land of the dead is the land from which the ancestors came. Thus the destiny of one section of the community may be different from that of another. If the ancestors came from oversea the dead may be placed in canoes; or they may be made to face the land of origin.

See Tylor, *Primitive Culture*; Spencer, *Principles of Sociology*; Fustel de Coulanges, *La Cité antique*; Oldenberg, *Die Religion des Veda* (1894); Jevons, *Introduction to History of Religion* (1896); Grant Allen, *Evolution of Idea of God* (1897); Brunton, *Religion of Primitive Peoples* (1897); Grüneisen, *Ahnenkultus und die Urreligion Israels* (1900); Garnier, *Worship of the Dead* (1909); de Groot, *Religious System of China* (vols. iv., v., vi., 1901–10); Frazer, *Belief in Immortality and Worship of the Dead* (1913 *et seq.*); Rohde, *Psyche* (trans. 1925); also the articles ANIMISM, ANTHROPOMORPHISM, EUHEMERISM, TOTEMISM, RELIGION.

Anchises. See ÆNEAS.

Anchitherium, a noteworthy animal that lived in Europe and North America during Upper Eocene and Miocene times. It had affinities to the tapir-like Palæotherium (q.v.) and true horse. Each foot had three hoofs, the middle one being the largest, and all reached to the ground. The anchitherium was about the size of a small pony, and is looked upon as one of the ancestors of the existing horse.

Anchor, an implement for retaining a ship in a particular spot, by temporarily chaining it to the bed of a sea or river. Many forms of anchor were made by the ancients; some were merely large stones; others, crooked pieces of wood, weighted to make them sink in water, the earlier ones acting mainly as weights, and holding the vessel by their own inertia instead of hooking into the ground. The first *iron* anchors are supposed to have been used by the Greeks. As originally made, the anchor had only one fluke or arm for penetrating the ground, and no stock. A large-sized modern anchor, irrespective of recent improvements, comprises the following parts (see fig. 1): The vertical or supporting beam of the anchor is the *shank*, B; at the upper end of it is a *ring*, *r*, or a shackle, and just below the ring is a transverse piece called the *stock*, *s s*; the other extremity is the *crown*, *c*, from which branch out two *arms* or *blades*, *g*, in directions nearly at right angles to that of the stock; each arm spreads out into a broad *palm* or *fluke*, *h*, the sharp extremity of which is the *peak* or *bill*, *k*. When the anchor is let go from the ship's side, the crown first strikes the ground; it then falls over in such a manner that one end of the stock rests upon the ground; and the subsequent movements of the ship and the cable cause one or other of the flukes to enter the ground, and take fast hold.

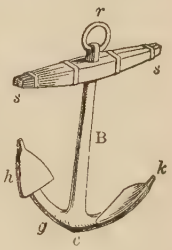


Fig. 1.—Anchor of Admiralty Pattern.

The number of anchors in British ships-of-war varies according to the size of vessel, and the character of the service intended. A large ironclad carries 8 anchors—2 'bowers,' 2 'sheets,' 1 'stream,' 1 'stern,' and 2 'kedges.' Smaller vessels have fewer and smaller anchors; and the 'stream'-anchor of a large ship may conveniently serve as the 'bower' for a smaller, the difference between bower, sheet, and spare anchors being rather in size than in design. Lloyd's rules prescribe the number and weight of anchors which must be carried by ships of different sizes registered in their list, as well as the size and length of their cables, hawsers, and warps.

Some of these particulars are given in the table:

Ship's Tonnage.	Anchors.				Stud-Chain Cables.		
	No. of Bowers.	No. of Others.	Weight of each Bower.*	Admiralty Test.	Size (Minimum).	Length.	Admiralty Test.
			cwts.	tons.	inches.	fath.	tons.
100	2	2	5	$7\frac{7}{20}$	$\frac{13}{16}$	135	$11\frac{7}{8}$
200	3	2	$8\frac{1}{4}$	$10\frac{9}{20}$	$1\frac{1}{16}$	165	$20\frac{3}{10}$
500	3	3	18	19	$1\frac{7}{16}$	240	$37\frac{1}{2}$
1000	3	3	30	$28\frac{3}{4}$	$1\frac{13}{16}$	270	$55\frac{1}{2}$
1400	3	3	34	$31\frac{1}{20}$	$1\frac{1}{8}$	270	$63\frac{1}{4}$
2000	3	3	40	$35\frac{1}{2}$	$2\frac{1}{16}$	270	$76\frac{3}{20}$
2500	3	3	42	$37\frac{7}{20}$	$2\frac{3}{16}$	300	$86\frac{1}{4}$
3000	3	3	45	$39\frac{1}{20}$	$2\frac{5}{16}$	300	$96\frac{1}{4}$

* Excluding stock.

Steamers are only required to carry the anchors and cables which belong to a sailing-vessel of two-thirds their total tonnage.

Many improvements in the shape and construction of anchors of the standard type have been introduced during the past forty or fifty years, of which Rodgers' and Lenox's anchors are the best known; and latterly several novel and improved forms have received extensive adoption—especially in vessels for merchant service. One of the most important changes is that effected under Rodgers' patent of 1838, also known as Honibal's. The arms, instead of being solidly connected to the shank, are movable in relation to it. They pivot about a bolt passing through the crown-piece of the arms and the end of the shank, the latter being fork-shaped to receive the former. The principle will be understood from fig. 2, repro-

senting an early form of Trotman's anchor, which is an improved modification of Porter's, the difference mainly consisting in the shape and disposition of the flukes and their horns or toggles. The advantages of this anchor over those of ordinary make are very considerable. Besides the increased holding-power due to the pivoting of the arm, and diminished chance of the anchor lodging on its stock end, there is less danger of its 'fouling'—in other words, of the cable becoming entangled with the upper fluke—because of the reduced height that the fluke projects above ground when the lower one

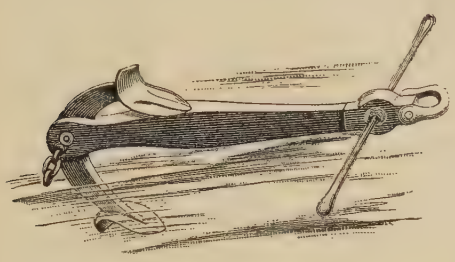


Fig. 2.—Trotman's Anchor at Work.

has taken hold. The construction of the anchor is of course more complex than the ordinary solid anchor, and its peculiar form makes it somewhat awkward to 'fish,' and still more difficult to 'sweep,' in the event of the cable parting. On the other hand, it is very conveniently stowed on ship-board. In 1852 the Admiralty appointed a committee to make an elaborate trial of a large number of anchors; and that which obtained the highest place was Trotman's.

An anchor radically different is that patented by Martin, a Frenchman. It is self-canting, and both flukes are utilised at one operation for maintaining a hold of the ground. The arms, which are in one piece, are fitted through a hole in the crown end of the shank, which is increased in area for the purpose, and they are free to swing through a range of 30° relatively to the shank. Thus, on whatever side the anchor falls, the arms by their own weight and the pull of the cable are made to take hold of the ground at once. The stock, which is flat and broad, is fitted across the shank in the same direction as the arms. This anchor is simple in construction, being made in three separate forgings, without a weld, and is easily housed. The Admiralty—who favour this

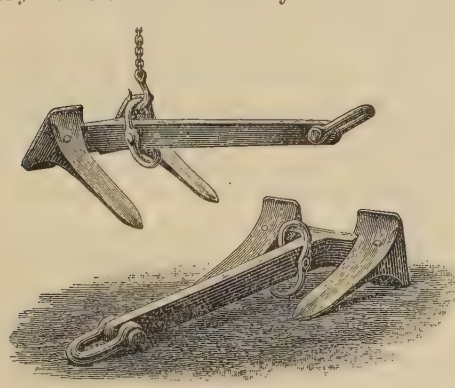


Fig. 3.—Smith's Stockless Anchor.

anchor for special types of vessels—allow a reduction of 25 per cent. in weight; using an 80-cwt. Martin's anchor (with stock) where a 90-cwt. (with stock, 108 to 112 cwt.) Admiralty or Rodgers' anchor would be fitted.

Several anchors which appear to be modifications of Martin's have recently been introduced. One of these being pretty extensively adopted is Wastenay Smith's stockless anchor (shown by fig. 3). Like Martin's, it is self-canting, and both flukes take hold of the ground at once, no matter how the anchor falls. The stock being dispensed with, a large saving in weight is effected.

A recent innovation, for which anchors of the type just described readily adapt themselves, is the formation of a recess in the ship's side at the mouth of the hawse-pipes, in which to house the anchors instead of hoisting them on deck—an arrangement which offers very considerable advantages over the ordinary system.

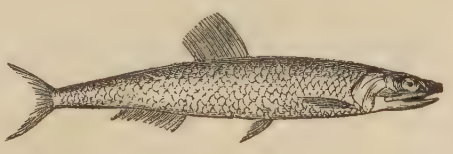
Till the introduction of the steam-hammer, anchor-making was the most formidable smith's work, on account of the great size and weight of the pieces of iron. The anchor-smiths wielded the most ponderous sledge-hammers known to our artisans. An even greater recent change is that crucible cast-steel is now taking the place of wrought-iron for anchors. At some of the government dockyards, anchor-making is conducted on a great scale; but the larger portion of the supply for the navy is obtained by contract with private firms.

Anchorage is a due or toll levied on the owner or captain of a ship for permission to cast anchor at special anchoring-grounds. In most instances it is payable to the state; but sometimes the right is vested in corporate bodies or in individuals. Anchorage also signifies 'anchor-ground,' the best ground being stiff clay, and, next to it, a firm sand.

Anchor-ice, or GROUND-ICE, a kind of ice which forms upon the beds of rivers, or shallow brackish seas. It only begins to form when the temperature of the atmosphere falls to within 10° F., and it does not adhere strongly to the bottom until zero is reached. It is somewhat porous or sponge-like in appearance, and when it rises to the surface, it frequently brings with it the stones or boulders to which it is attached. It is where the flow of the water is most interrupted and tumultuous that this kind of ice forms most readily; it seems not to form in perfectly still water, however clear. See ICE, and a work by Barnes (1907).

Anchorite. See HERMIT.

Ancho'vy (*Engraulis enchrasicholus*), a small bony fish of the herring family (Clupeidæ), of some importance as a food-luxury. It may attain a length of eight inches, but usually measures only about a finger's length. The snout of the pointed head projects considerably beyond the lower jaw, the abdomen and sides are covered with large silvery scales, the back has a greenish-blue colour, the tail is deeply forked. The species occurs



Anchovy.

abundantly round the European coasts, especially in the southern and Mediterranean region, while the genus is represented in all the warmer waters. It would seem to have been formerly more abundant in the British seas, as several acts of parliament in the reign of William and Mary regulated the anchovy fisheries. It seems, however, that the

fishery, rather than the supply of fish, has declined. In spring, shoals of anchovies leave the deep seas and approach the shore for spawning purposes. They are fished at night; attracted by lights, and captured by the seine net. They are salted, and used for sauces, &c. Three species are found in North American Atlantic waters, and four on the Pacific side. The Romans seem to have used them for the esteemed fish sauce called *garum*, and the Indian species (*E. brownii*) is used for making the condiment called Red Fish.

Anchovy Pear (*Grias cauliflora*), a tree belonging to a small genus of Lecythidaceæ. It grows in boggy places in the mountainous districts of Jamaica and other West Indian islands, attains a height of 50 feet, and has great oblong leaves 2 or 3 feet in length. The fruit is pickled and eaten like the East Indian mango, which it much resembles in taste.

Anchusa. See ALKANET.

Anchylosis. See ANKYLOSIS.

Ancient Lights. See LIGHT (last paragraph).

Ancient Monuments. See MONUMENTS.

Ancillon, JOHANN PETER FRIEDRICH (1767–1837), a member of a French family which, after the revocation of the Edict of Nantes, migrated into Prussia, was born in Berlin. Pastor of the French refugees, he was in 1792 appointed professor of History in the Military Academy of Berlin, in 1810 tutor to the crown-prince (Frederick William IV.), having become known by his *Révolutions du système politique de l'Europe* (4 vols. 1803–5), and in 1832 foreign minister (of a rather reactionary type).

Ancón, a modern watering-place and ancient burying-ground in Peru, on the coast, 35 miles NW. of Lima. For mummies and other remains, see Reiss and Stübel (trans. Keane, 1880–87).

Anco'na, capital of a province in Italy, is situated on a promontory of the Adriatic coast, 130 miles NE. of Rome; pop. (1921) 66,291. Ancona province has an area of 750 sq. m.; pop. 334,654. The harbour, which had become silted up, has been greatly improved since 1887. It is now one of Italy's best harbours, one of the leading Adriatic ports, and an important naval station; and its commerce, which had declined, has revived. Imports (coal, coke, grain, chemicals, jute, fish, &c.) greatly exceed exports (silk waste and twist, asphalt, salted hides, calcium carbide, jute cloth, tartar, fruit, vegetables, sulphur). Ancona has shipbuilding yards and engineering works; and other local industries are indicated by its exports. Modern forts on the neighbouring heights have superseded the old citadel, long the city's only fortification. A mole of 2000 feet in length, built by the Emperor Trajan, and a triumphal arch of the same emperor, are the most notable monuments of antiquity. One of the most venerable buildings is the cathedral of San Ciriaco, built in the 11th century, and possessing the oldest cupola in Italy. In the old town the houses are in general mean, and the streets narrow. Ancona (which owes its name to its situation on an elbow-shaped promontory: Greek, ἀγκών, 'an elbow') is supposed to have been founded about 380 B.C. by Syracusans, who had fled from the tyranny of Dionysius the Elder. It was destroyed by the Goths, rebuilt by Narses, and again destroyed by the Saracens in the 10th century. It afterwards became a republic; but in 1532 Pope Clement VII. annexed it to the States of the Church. In 1797 it was taken by the French; but in 1799 General Meunier was obliged to surrender it to the Russians and Austrians, after a long and gallant defence. In 1832 a French force took possession of the town and kept it in their hands till 1838, when both French and Austrians retired from the Papal States. In 1849 a revolutionary garrison in Ancona capitulated after enduring a siege by the Austrians of 25 days. In 1861 the flag of the kingdom of Italy waved over the ancient city.—*The March of Ancona* was the name applied to the territory lying between the Adriatic and the Apennines, from Tronto NW. to San Marino. Erected into an independent marquisate under the Longobards, the district was a papal dependency from the 13th century, but passed into the hands of Victor-Emmanuel in 1860.

Ancre, BARON DE LUSSIGNY, MARSHAL D', originally Concino Concini, was a Florentine by birth, and came to the French court in 1600, in the train of Maria de' Medici, the wife of Henry IV. He married Leonore Galigaï, one of the queen's women, and aided her in promoting the disagreement between the king and queen. After Henry's death, he became chief favourite and adviser of the queen-regent, and was raised to post after post of profit and honour, becoming at length marquis, and, in 1614, even marshal of France, though he had never seen war. His prodigality was immense, and he squandered enormous sums on the decoration of his palaces. Hated alike by nobility and populace, he was assassinated in the Louvre in open day, on the 24th of April 1617, the young king Louis XIII. himself being privy to the plot. His body was dragged by the mob through the streets, and burned before the statue of Henry IV. His wife was executed for having practised witchcraft to gain influence over the queen.

Ancren Riwle ('The Rule of the Anchoresses') is the name of a famous Middle English religious work dating from the first quarter of the 13th century. It was a prose treatise written for the spiritual guidance of a little community of three women, perhaps Cistercian nuns, living at Tarente or Tarrant-Keynston on the Stour in Dorsetshire; and is interesting not merely as a monument of the current English of the period, but for its homely eloquence, its devoutness, its sensible hostility to needless austerities, and its sense of humour. The work, which consists of eight books, has been ascribed to Richard Poor (died in 1237 bishop of Durham), who was perhaps born at Tarrant, and certainly caused his heart to be buried here. Another account is that it was written by Simon of Ghent, bishop of Salisbury, for his own sisters, nuns at Tarrant.

The *Ancren Riwle* was edited for the Camden Society in 1853 by the Rev. J. Morton. A Latin Version also exists with the title *Regulae Inclusarum.*

Ancrum Moor, Roxburghshire, 5¼ miles NW. of Jedburgh, was in 1544 the scene of the defeat of 5000 English under Sir Ralph Evers and Sir Brian Latoun, by a Scottish force under the Earl of Angus and Scott of Buccleuch. A monument marks the spot where Lilliard, a Scottish maiden, is said to have done prodigies of valour.

Ancus Marcius. See ROME (*History*).

Ancyra. See ANGORA.

Andalu'sia (Span. *Andalucía*), a large and fertile region occupying the south of Spain. Its shores are washed both by the Mediterranean and the Atlantic; and, though it is not now a political division of Spain, it is more frequently spoken of than the eight modern provinces into which it has been divided. The name is a form of *Vandalitia* or *Vandalusia*, from the Vandals, who overran it in the 5th century. When it was a Phœnician trade emporium, it was called Tartessus (probably the *Tarshish* of the Bible); the Romans named it Bætica, from the river Bætis, the modern Guadalquivir. In the 8th century, the Moors founded

here a splendid monarchy, the four capitals being Seville, Córdoba, Jaén, and Granada. During the darkness of the middle ages, Córdoba was 'the Athens of the west, the seat of arts and sciences.' Buildings such as the Alhambra at Granada, the Mosque at Córdoba, the Giralda and Alcázar at Seville testify to the greatness of the Moorish civilisation. The Moorish kingdoms were conquered by the Castilians in 1235–48. Christian intolerance seriously and permanently impoverished the country. Painting arose later in a new form in the schools of Velázquez and Murillo. Andalusia mainly consists of the great basin of the Guadalquivir, and the mountainous districts which bound it. Mulhacén (11,420 feet), in the Sierra Nevada, is the highest peak in Spain. Andalusia was called the garden and the granary of Spain; but now such names are merited only by portions of the country on both sides of the Guadalquivir, where the soil is luxuriantly productive, and the vegetation is tropical. Cotton and sugar-cane flourish in the open air, and the cactus and aloe form impenetrable hedges. Wine and oil abound; but some tracts in the west are very barren, owing to deficiency of water. Andalusia is, however, still one of the most fertile districts of Spain, owing to its delicious climate and the abundance of water supplied by its snowy mountains. Its breeds of horses and mules have long been celebrated. The mountains yield silver, copper, lead, iron, and coal; and some ores are extensively worked. The Andalusians are lively, imaginative, and pleasure-loving, boastful, unwarlike, and superstitious. They speak a dialect of Spanish manifestly tinctured with traces of Arabic. Andalusia is divided into the provinces of Almería, Jaén, Málaga, Cádiz, Huelva, Sevilla, Córdoba, and Granada. The chief towns are Sevilla (Seville), Córdoba, Jaén, and Cádiz (q.v.). Area, 34,300 sq. m.; pop. (1921) 4,257,139.

Andalusite, a mineral consisting of silicate of aluminium, occurs in slightly rhombic, four-sided prisms, and also in a massive form; pearl-gray or reddish in colour. It is met with not infrequently as a constituent of certain metamorphic rocks, as *Andalusite-schist.* A variety of andalusite is known as *chiastolite* (Gr. *chiastos,* 'decussated'). The crystals of this variety, when broken across, often show cruciform or tessellated patterns. They are common in certain altered argillaceous rocks.

An'damans, a group of thickly wooded islands towards the east side of the Bay of Bengal, about 680 miles S. of the Hugli, between 10° and 14° N. lat., and 92° and 94° E. long. They consist of the Great and Little Andaman groups (with different languages and culture), surrounded by many smaller islands. Great Andaman is nearly 160 miles long and 20 miles broad, and comprises five islands, lying close together, North, Middle, and South Andaman, Baratang, and Rutland Island. Little Andaman, which lies about 30 miles S. of the larger group, is 26 miles long by 16 miles broad. The total area is 2500 sq. m. The islands are covered with dense tropical forest, and the climate is warm and moist with heavy rainfall. The native inhabitants stand in the lowest stage of civilisation, and belong to the Negrito race, coming originally, probably, from Lower Burma; their number in Great Andaman is about 700; in Little Andaman, about 600. Their religion is animistic. Those that have come into contact with the convicts have deteriorated morally. Their height seldom reaches five feet; their complexion is very dark, the hair crisp and woolly. They subsist on fruits and beasts of the wood, and upon fish. A British settlement was made on North Andaman in 1789, but abandoned in 1796 for Penang. The capital of the present settlement is at Port Blair, on South Andaman, the largest island of the group. The harbour here is excellent. Since 1858 the Andamans have been a penal settlement for Indian convicts, but this practice is being discontinued. The civil, military, and convict population of Port Blair is over 13,000.

See books by Man (1885), Boden Kloss (1903), Sir R. Temple (1904), Mrs Talbot Clifton (*Pilgrims to the Isles of Penance,* 1912); A. R. Brown (*Andaman Islanders,* 1922).

Andan'te (Italian), in Music, implies a movement somewhat slow and sedate, but in a gentle and soothing style. This term is often modified —as *Andante affettuoso,* slow, and pathetically; *Andante cantabile,* slow, in a singing style; *Andante con moto,* slow, with emotion; *Andante grazioso,* slow, and gracefully; *Andante maestoso,* slow, with majesty; *Andante non troppo,* slow, but not too much so; *Andante pastorale,* slow, and with pastoral simplicity. See ADAGIO, SYMPHONY. —*Andantino,* properly somewhat slower, for many composers means a little faster than *Andante.*

Andelys, LES, a town in the Norman department of Eure, France, consisting of Great and Little Andely, situated less than a mile apart, and about 20 miles NE. of Évreux. Great Andely has a Gothic church of the 13th century, with fine painted glass. Little Andely, close by the Seine, stands below the castle rock of Château Gaillard, a castle built by Richard Cœur de Lion to command the Seine, and taken and retaken during the old wars between England and France. Pop. 5000.

Andenne, a town of Belgium, 12 miles E. of Namur by rail, manufactures paper, porcelain, and tobacco-pipes, and has beds of pipe-clay and coal-mines in the neighbourhood; pop. 7000.

Anderab, or INDERAB, a town in Afghan Turkestan, on the northern slope of the Hindu Kush, 80 miles SSE. of Kunduz. It is an entrepôt of commerce between Persia and India. Pop. 6500.

Andermatt, or URSEREN, a Swiss village in the canton of Uri, about 18 miles S. of the Lake of Lucerne. As it is at the crossing of the St Gotthard road and that over the Furka Pass, it has long been famous both as a tourist centre and for a considerable transit trade. The St Gotthard railway does not touch the village.

Andernach, a little town belonging to the district of Coblenz on the Rhine, was once a Roman fortress styled Antunnacum, then a residence of the Merovingian kings, and afterwards became one of the most flourishing places on the Rhine. The great tower on the north side, the fine old church (partly built in the Carlovingian times), the old gate and town-walls, the ruins of the great castle of the Archbishops of Cologne, and other relics of antiquity, give quite a medieval aspect to the town. It now contains about 10,000 people, and is celebrated for its millstones, and for cement made of its tufa rock or trass.

Andersen, HANS CHRISTIAN, one of the great story-tellers of the world, the most widely popular of Danish authors, was born April 2, 1805, at Odense in Fünen. The son of a poor shoemaker, after his father's death he worked for some time in a factory, but his wonderful singing and extraordinary talent soon procured him friends and patrons, of whom the earliest was Madame Bunkeflod, widow of a poet of some reputation. He early displayed a talent for poetry, and was known in his native place as 'the comedy-writer.' Hoping to obtain an engagement in the theatre, he found his way to Copenhagen, but was rejected for his lack of education. He next tried to become a singer, but soon found that his physical qualities were quite unfitted for the stage. Generous friends,

however, helped him in his distress; and application having been made by one of them to the king, he was placed at an advanced school at the public expense, and so enabled to get the better of the defects of his education. Some of his poems, particularly the one entitled *The Dying Child*, had already been favourably received, and he now became better known by the publication of his *Walk to Amak*, a literary satire in the form of a humorous narrative. In 1830 he published the first collected volume of his *Poems*, and in 1831 a second, under the title of *Fantasies and Sketches*. Spite of his genius and industry he failed to please the critics, and his genial egotism made him an easy butt for their clumsy ridicule. A travelling pension granted him by the king in 1833 removed him from his miseries, and supplied what was needful for his mental development. Some of its fruits were his *Travelling Sketches* of a tour in the north of Germany; *Agnes and the Merman*, completed in Switzerland; and *The Improvisatore*, a series of scenes depicted in a glowing style, and full of poetic interest, inspired by the genial atmosphere of Rome and Naples. The public opinion, not of Denmark alone, but of Europe, asserted itself about the merits of the last of these books, and henceforth its author was safe from the critics. Soon afterwards, he produced *O.T.* (1836), a novel containing vivid pictures of northern scenery and manners, which was followed (1837) by another, entitled *Only a Fiddler*. In 1840 he produced a romantic drama entitled *The Mulatto*, which was well received; but another drama, *Raphaella*, was less successful. In the same year appeared his *Picture-book without Pictures*, a series of the finest imaginative sketches. In the end of 1840 he commenced a somewhat lengthened tour in Italy and the East, of which he gave an account in *A Poet's Bazaar* (1842). In 1844 Andersen visited the court of Denmark by special invitation, and in the following year he received an annuity. After that date he travelled much, visiting England as well as other countries. Among other works of Andersen are *The Story of My Life* (1855); *New Tales and Adventures* (1858–61); *Tales from Jutland* (1859); *The Sandhills of Jutland* (1860); *Tales for Children* (1861); *The Wild Swans*, and *The Ice Maiden* (1863).

His fame has long been more than European. His *Dying Child* has been translated into the language of Greenland; and on his seventieth birthday he was presented with a book containing one of his tales in fifteen languages. On the same occasion the king of Denmark gave him the Grand Cross of the Dannebrog Order. He died at Copenhagen, August 4, 1875. In his autobiography, Andersen has told the story of his life with all his peculiar charm. Most of his tales, moreover, were suggested by the incidents of his own life. Even his most fantastic stories have usually a background of actual experience, and perhaps to this is due, in no small degree, their most abiding charm—the perfectly naïve and inimitable sense of reality and truth, even in incidents quite out of the world of the ordinary and the natural. His heavy face and ungraceful form hid a heart that overflowed with love for all lovely things; he secured himself the surest immortality in the heart of the children of the civilised world.

See, besides the egotistic *Story of my Life* (trans. 1871), his *Correspondence with the Grand-Duke of Saxe-Weimar* (trans. 1891) and the Life by R. Nisbet Bain (1895).

Anderson, ALEXANDER (1845–1909), a railway platelayer, born at Kirkconnel, Dumfriesshire, wrote *Songs of Labour* (1873), *Songs of the Rail* (1877), &c., and was librarian to Edinburgh University.

Anderson, ELIZABETH GARRETT (1836–1917), was born in London and brought up chiefly at Aldeburgh, Suffolk. In 1860 she studied medicine with much credit at the Middlesex Hospital; but a petition from the students against the admission of women prevented her return. Miss Garrett met other obstacles, but in 1865 she passed the Apothecaries' Hall examination with credit, and in 1866 received her first dispensary appointment. In 1870 she was made a visiting physician to the East London Hospital, headed the poll for the London School Board, and was made M.D. by the university of Paris. In 1871 she married Mr Anderson (died 1907). She wrote on professional and social subjects, held many important professional posts, and in 1907 was made mayor of Aldeburgh, the first woman mayor in England. See WOMEN'S RIGHTS.

Anderson, JAMES, antiquary, was born at Edinburgh in 1662, and admitted a W.S. in 1691. In 1705 he published a treatise vindicating the independence of Scotland; thenceforward he was employed on his *Selectus Diplomatum et Numismatum Scotiæ Thesaurus*, which did not appear till 1739. He died in 1728.

Anderson, JAMES, a writer on political economy and agriculture, was born in 1739, at Hermiston, near Edinburgh; and while managing the family farm, he attended chemistry classes. He invented the small two-horse plough without wheels, commonly called the Scotch plough. When only twenty-four years of age, he rented a large farm in Aberdeenshire, where he wrote a series of essays upon agriculture; and in 1780, the university of Aberdeen bestowed on him the degree of LL.D. In Edinburgh he edited (1790–93) a periodical called *The Bee;* in 1797 he went to London, where he died in 1808. He greatly helped in promoting agriculture in Scotland; and in an essay in his *Recreations of Agriculture*, he anticipated some important principles subsequently advocated by Malthus and Ricardo, particularly the famous theory of rent.

Anderson, JOHN, founder of the college in Glasgow bearing his name, was born in the parish of Roseneath, Dumbartonshire, in 1726. He studied at the university of Glasgow, in which he was for four years professor of Oriental Languages; in 1760 he was transferred to the chair of Natural Philosophy. In addition to his usual class in physics, he instituted one for artisans, which he continued to teach to the end of his life. In 1786 appeared his *Institutes of Physics*, which went through five editions in ten years. He invented a species of gun, the recoil of which was stopped by the condensation of common air within the body of the carriage; but having in vain endeavoured to attract the attention of the British government to it, he went to Paris in 1791, and presented his model to the National Convention. It was hung up in their hall, with the following inscription over it: 'The gift of Science to Liberty.' Afterwards, when the allied monarchical forces had drawn a military cordon around the frontiers of France, Anderson ingeniously suggested the expedient, which was adopted, of making small balloons of paper, to which newspapers and manifestoes might be tied, and so carried to Germany. Anderson died in 1796, and by his will he directed that the whole of his effects, of every kind, should be devoted to the establishment of an educational institution in Glasgow, for the use of the unacademical classes.

ANDERSON'S COLLEGE was originally intended to be a university of four colleges. The funds being inadequate to the proposed plan, the institution was opened with only a single course of lectures on Natural Philosophy and Chemistry, by Dr Thomas Garnett in 1796. In 1798 a professor of Mathematics and Geography was appointed. In 1799

Dr Birkbeck, the successor of Dr Garnett, commenced the system of giving a familiar exposition of mechanics and general science, and this was the origin of mechanics' institutes.

In 1861–1870 the endowments were augmented by Freeland, Ewing, and Young. The institution gradually enlarged the scope of its teaching. Instruction was given in Mathematics, Latin, Greek, Hebrew, French, &c., but was afterwards limited to medicine, physics, chemistry, and botany. In 1886 the non-medical school was incorporated with five other institutions as the Glasgow and West of Scotland Technical College (since 1912 the Royal Technical College), of whose new buildings the memorial stone was laid in 1903. It was affiliated to the university in 1913.

Anderson, MARY, a distinguished actress, was born at Sacramento, California, July 28, 1859, of Catholic parentage, her father being a Confederate officer who lost his life in the civil war. She played for the first time at Louisville, in 1875, in the character of Juliet. Her success was marked and immediate, and during the following years she played with increasing popularity in the principal cities of the Union in various rôles. In 1883 she appeared at the Lyceum Theatre in London, and became a favourite in England. In 1890 she married M. Navarro de Viana of New York.

Andersonville, a village in Georgia, U.S., noted as having been the seat of a Confederate States military prison, which was notorious for unhealthfulness and for barbarity of discipline. Between February 15, 1864, and April 1865, 49,485 prisoners were received, of whom 12,926 died in that time of various diseases. Henry Wirz, the superintendent, was tried for injuring the health and destroying the lives of the soldiers confined here, was found guilty, and hanged, November 10, 1865. The long trenches where the soldiers were buried have since been laid out as a cemetery.

Andersson, KARL JOHAN, an African explorer, born in Sweden, in the province of Vermland, in 1827. In 1850 he joined Francis Galton in a journey to the territories of the Damaras and Ovampos, and in 1853–54 continued the exploration alone, publishing, on his return to England, *Lake Ngami, or Discoveries in South Africa* (Lond. 1856). In 1858 he explored the Okavango (*The Okavango River*, Lond. 1861), and in 1866 he set out, almost unattended, on an expedition to the Cunene. He came within sight of the stream, but, weakened with dysentery, had to retrace his steps, and died on the homeward journey, July 5, 1867.

Andes, a lofty mountain-system of South America, extending north and south closely parallel with the Pacific coast of that continent, throughout its whole extent, from lat. 56° 30′ S. to 11° N. Geographically, it may be regarded as an extension of the vast and complicated mountain-system of Western North America, although it is not distinctly connected with that system. As the Andean chain approaches the Isthmus of Darien, after having crossed the Atrato, it is represented by a low crest of serpentine, at one point only 130 feet high; and much of the Isthmus proper is even lower than that.

The mountains of the Fuegian Archipelago, south of the mainland of South America, must be held to belong to this system. Cape Horn, on a detached island, is regarded as the most southerly point of the chain, which, however, may be said to extend to the rocky islets of Diego Ramirez, 60 miles SW. of the Cape. Without allowing for curves, the Andes extend some 4500 English miles. For about 1000 miles (south of Chiloe), the mountains not only reach the ocean, but in part stand in its waters, for the great Chonos Archipelago is only an irregular double chain of mountains. Indeed some geographers hold that these islands for at least 300 miles north of Cape Horn, in reality represent the main chain of the Andes. The Patagonian portion of the system is much cut by steep ravines, sometimes partly filled with glaciers, and not seldom occupied by deep fjords, or arms of the sea. On the eastern slope in Patagonia lie vast masses of granite, porphyry, basalt, and lava; and on both sides of the ranges vegetation is luxuriant; extensive forests covering a large proportion of the surface. This is chiefly due to the excessive abundance of the rainfall, to which cause also must be ascribed the numerous and rather large sub-Andean lakes of Patagonia, and the swift and copious streams which water its wild and gloomy terraces—for the ascent to the mountains is here by a step-like succession of steep rises. The Patagonian Andes cover a strip of land from 20 to 50 miles in breadth, and, as will be seen in the table given below, are not of great height.

Between lat. 42° and 24° S. the main chain of the Andes recedes from the sea-coast, leaving in Chile a tract of country nowhere exceeding 120 geographical miles in breadth. The mountains here reach a mean elevation of 11,830 feet; one of the peaks (Aconcagua) is the loftiest on the American continent. In this region, both to the north and to the south, there is but one main line of peaks; but between these two parts two high parallel ranges occur, having between them a relatively low plateau. A low parallel ridge of granite skirts the mountains to seaward. On the Argentine side a great number of buttress-like processes extend into the Pampas country, chiefly having a south-easterly direction, except to the northward, where they are numerous, and are nearly parallel with the main Andes. The Bolivian Andes occupy perhaps one-third of the area of the republic. They form a vast arid region of great elevation. The east and west Cordilleras of Bolivia inclose the land-locked plateau of the Desaguadero, 13,000 feet in height, and having an area of 30,000 sq. m. It has thus about the superficial extent of Ireland, and has been called 'the navel of South America.' In the vicinity are several much smaller land-locked basins of similar character; and near at hand are some of the loftiest of the Andean summits.

The Peruvian Andes present features of great interest. The maritime Cordillera overlooks the sea in a close succession of volcanic cones. Near lat. 10° S. the chain divides into the seaward Cordillera Negra, and the more eastward Cordillera Nevada, with a deep trough or ravine intervening. The central Cordillera of Peru is the chain which bounds the Titicaca basin on the west. No river, except the Maranon (Upper Amazon), cuts through its vast wall-like ridges. The eastern Andes of Peru lie between a high, cool, western valley and the hot and seething forest plains of the Amazonian basin. They form a magnificent succession of grand peaks, with only very local evidences of recent volcanic action. To the north they decline greatly in elevation. Here the grandest scenery of the Andes is to be witnessed. The lofty wildernesses of the high Peruvian Andes form a cold and wind-swept region known as the Puna, and are scarcely habitable. In the SW. of Ecuador the various ridges of the Andes coalesce, immediately to divide again into two main chains, both characterised by intense volcanic activity. Transverse ridges divide the intervening valley into three basins, that of Cuenca in the south, Ambato in the centre, and Quito (with its fine climate and productive soil) in the north. The Cuenca basin is 7800 feet in elevation, that of Ambato 8500, and that of Quito 9500 feet.

The Colombian Andes are disposed in three main lines. The maritime range runs north and ends at Cape Tiburon, on the coast of the Caribbean Sea. It declines greatly in height to the northward, and the same thing is true of the central range, which in the south, near the great *paramo* or tableland of Cruz Verde, are very lofty. The very lofty eastern range (Cordillera of Suma Paz) extends to the NE., and near the Venezuelan boundary it forks out into two chains, one of which forms the Goajira peninsula west of Lake Maracaibo, and the other becomes the main Venezuelan mountain-system. Near Carácas the mountains skirt the sea-coast. Only a few of the peaks of the Venezuelan Andes rise above the snow-line.

PLATEAUS.

Of the numerous plateaus of the Andes system, one, Assuay, is at a height of 14,500 feet. That of Titicaca, the Collao, is 12,500 feet; of Cruz Verde, 11,695 feet; of Pasco, 11,000 feet; of Quito, 9500 feet; of Bogotá, 8958 feet.

HEIGHTS OF MOUNTAINS.

	Feet.
Fuegian Andes:	
Mount Sarmiento	6910
Mount Darwin	6600
Cape Horn	3000
Patagonian Andes:	
Yanteles	8030
Corcovado (volcano)	7510
Chilean Andes Proper:	
Aconcagua	23,080
Cima del Mercedario	22,315
Tupungato	21,550
Bolivian Andes:	
Sajama	21,050
Sorata	21,500
Illimani	21,080
Peruvian Andes:	
Huascan	22,000
Huandoy	21,088
Arequipa (Misti)	21,812

HEIGHTS OF MOUNTAINS.

	Feet.
Ecuadorian Andes:	
Chimborazo	20,517
Cotopaxi	19,550
Antisana	19,260
Cayambe	19,200
Colombian Andes:	
Cocui	19,300
Tolima	18,314
Sierra Nevada de Santa Marta	17,500
Venezuelan Andes:	
Sierra de Mérida	15,342

PASSES.

Of nine notable Chilean passes, the lowest (Planchón) is 11,455 feet high, the highest (Dona Ana), 14,770 feet. In the Bolivian Andes the passes of Potosí and Gualillos are respectively 14,320 and 14,330 feet; of Peruvian passes, Jacaibamba is 15,135 feet, and Antarunga, 16,196 feet high; while Assuay, in the Ecuadorian Andes, is 12,385 feet; and Quindio, in the Colombian Andes, is 11,500 feet high.

Geologically, the Andes are by no means a unity. It is certain that the elevation of the different parts must have occurred at various times. The great bulk of the mountain masses is composed of stratified rocks, largely made up of materials which were deposited at the sea-bottom. It is believed that as a whole the formative sediment must have accumulated on subsiding areas. Upheaval, denudation, and direct volcanic action have been the other leading factors in the building and shaping of the mountains. The mineral wealth is great and varied. Volcanic action is still very active in Ecuador, but less so in the other parts of the chain. The Chilean volcanoes are numerous, but are seldom very active. Earthquakes occur frequently all along the coast from Carácas to Chiloé. Gold, silver, copper, mercury, and other metals are found in most parts of the Andes; see PERU, &c. Railway connection between the Atlantic and Pacific, between Buenos Aires and Valparaíso, through the Andes was established in 1910 by means of a series of tunnels in the La Cumbre pass, 12,600 feet high, one of them 10,000 feet long. There are other railways across the Andes in Peru, and from Chile into Bolivia; and to the south other links between Chile and Argentina are projected. For the effect of the Andes on the climate of the Pacific slope, see AMERICA. The awful cañons and chasms of the Andes, the sublime height of their peaks, the difficult and dangerous character of the passes, are characteristic features.

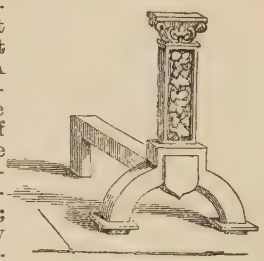
Andesine. See FELSPAR.

Andesite, a group of volcanic rocks, gray, reddish, or dark brown in colour. They consist essentially of plagioclase-felspar and some ferromagnesian mineral, as biotite, augite, hornblende, or hypersthene; the ground-mass is microlithic, scattered through which plagioclase and ferromagnesian minerals may appear as more or less conspicuous phenocrysts.

Andijan, a town of Uzbekistan, in Ferghana, near the Alai Mountains, on the Syr-Daria, 75 miles ENE. of Khokand, is on a branch of the Transcaspian Railway. There is much cotton culture, promoted by irrigation. Almost wholly destroyed by an earthquake in December 1902, the town has greatly increased. Pop. 80,000.

Andi'ra, a Brazilian genus of papilionaceous plants, one of which, *A. inermis* or Cabbage Tree, produces the anthelmintic Bastard Cabbage Bark.

Andirons, now more generally known as firedogs, were used for burning wood on an open hearth, and consisted of a horizontal bar raised on short supports, with an upright standard at one end. A pair were used, one standing at each side of the hearth, and the logs of wood rested across the horizontal bars. The upright portions of the andiron were of various forms; the design was frequently architectural, much ornamented with arabesques in silver or copper, and sometimes with the monograms of their possessors. Those for kitchen use had catches for holding the roasting apparatus.



Andiron.

Andkhui, a town and khanate in Afghan Turkestan. The town stands between the northern spurs of the Paropamisus and the Amu Daria (Oxus); it is due west of Balkh and on the edge of the desert. Down to the year 1840, it was subject to Bokhara. In that year, Mohammed Khan besieged it for four months, took it by storm, and left it a heap of ruins. To preserve himself from utter destruction, the khan threw himself into the arms of the Afghans. The tract in which it stands is fertile, but the place is proverbially unhealthy; the Persians account it 'a hell upon earth,' by reason of its scorching sands, brackish water, flies, and scorpions. The population is estimated at 15,000, consisting principally of Turkomans, with a mixture of Uzbegs and a few Tajiks. The khanate, though controlled by Kabul, has preserved some measure of independence.

Andorra, a small, semi-independent, neutral state, on the southern slope of the Eastern Pyrenees, between the French department of Ariège and the Spanish province of Lérida. Roughly circular in shape (with a diameter of some 15 miles), Andorra is enclosed and covered by mountains, rising to 9000 feet and penetrated by the Valira (or Balira) and subordinate valleys. The population, at one time estimated at 15,000, scarcely exceeds 5200. The area of Los Valles, as the Andorrans call their country, is 191 sq. m., divided into six parishes. The climate is severe. Once abundant forests have been much thinned for fuel; there is excellent pasturage for flocks and herds; cereals, fruit-trees, vines, and tobacco grow on the lower grounds; and the mountains contain iron and lead mines, granite, water-power, and mineral springs all of which await exploitation. The smuggling into France of tobacco (Andorra's only noteworthy manufacture) is actively carried on. Andorra is said to have been declared a free state by Charlemagne. The joint-suzerainty of the bishops of Urgel and the counts of Foix was defined in 1278. The counts' rights passed to the kings of Navarre, and so to France. Thanks to Franco-Spanish rivalry and its inaccessibility, Andorra has preserved its medieval autonomy. It

is governed by a council of twenty-four (elected by the heads of households), who choose a *syndic* (president) and vice-syndic. There are two civil and two criminal judges, the latter called *viguiers* (vicars); in both cases, one is appointed by France, one by the Bishop of Urgel. Annual tributes of 960 francs and 460 pesetas are paid to France and the bishop respectively. Since 1882 French interests are represented by the Prefect of Pyrénées Orientales. Andorra communicates with Urgel in Spain by the Valira valley; with France by the Emballira Pass (7500 feet). Carriage-roads are beginning to replace bridle-paths; the French have introduced telegraphs; and the Trans-Pyrenean Railway from Ax to Ripoll will further abate the isolation of Andorra. The Andorrans are good-natured, hard-working mountaineers, Catalan in speech, devout Roman Catholics. They cling jealously to their freedom (especially from military service). The capital is Andorra la Vieja (pop. 500).

See Harold Spender, *Through the High Pyrenees* (1898); L. G. Leary, *Andorra, the Hidden Republic* (1912); Scott O'Connor, *Travels in the Pyrenees* (1913); V. W. Johnson, *Andorra and San Marino* (1913); Bernard Newman, *Round about Andorra* (1928).

An'dover, a municipal borough and market town of Hampshire, 66 miles SW. of London. Originally *Andeafaran* (passage of the river Ande), Andover dates from a remote antiquity, and received charters from Henry I., Richard I., and John. Till 1867 it returned two members to parliament; till 1885, one. The chief trade of Andover consists in corn and malt; there used to be manufactures of shalloons. At Weyhill, 3 miles to the west, an October fair is held, formerly one of the most important in England. The church of Andover, rebuilt in 1849, is in the Early English style. A Roman villa and other relics of antiquity have been discovered near Andover. Population, 8600.

Andover, a village of Essex county, Massachusetts, 23 miles N. of Boston. Settled in 1643 from its English namesake, it is famous, even in Massachusetts, for its educational institutions. The Phillips Academy, instituted in 1780, is liberally constituted and well attended. The Andover Theological Seminary of the Congregationalists, an offshoot from it, was founded in 1807, for the purpose 'of providing for the church a learned, orthodox, and pious ministry.' With Harvard Divinity School it was formed in 1922 into the Theological School of Harvard University. The Abbot Female Academy is one of several other flourishing institutions. Pop. 8300.

Andral, GABRIEL, a celebrated French physician and pathologist, born at Paris, 6th November 1797. In 1827 he was called to the chair of Hygiene, in 1830 to that of Pathology, in the university of Paris. He died February 13, 1876. Andral may be said to have been the first to apply an analytical and inductive method to pathology. His *Clinique Médicale* (1824) established his reputation, and his *Précis d'Anatomie Pathologique* (1829) was equally successful. Other works of importance are his *Essai d'Hématologie Pathologique* (1843); *Cours de Pathologie Interne;* and *Recherches sur les Modifications de Proportion de quelques Principes du Sang.*

Andrássy, JULIUS, COUNT, a Hungarian statesman, was born at Zemplin, March 8, 1823. He was returned by his native town to the Presburg Diet of 1847, where he soon displayed oratorical and political powers of no mean order. He threw himself heartily into the revolutionary movement of 1848, and on its defeat was exiled, retiring to France and England, until the general amnesty of 1857 enabled him to return to his own country. He was elected a member of the Hungarian Diet in 1860, where his support of the Deák party secured him the office of vice-president; and, on the reorganisation of the Austro-Hungarian monarchy in 1867, he was appointed prime-minister of Hungary. The chief event of his administration was the civil and political emancipation of the Jews. In 1871 Count Andrassy became minister for foreign affairs, and in 1878 ably represented Austria at the Congress of Berlin. In 1879 he retired from public life, and died 18th February 1890.—His son, COUNT JULIUS, born in 1860, was elected deputy to the Hungarian parliament in 1885, and was minister for the interior 1906–10 in the coalition government. Andrássy always remained an opponent of Tisza. He became foreign minister for the Dual Monarchy in October 1918, and in 1921 was imprisoned for his share in Karl's *putsch* for the throne; he subsequently entered the Hungarian parliament. His works include *Die Ursachen des Bestehens des ungarischen Staats* (3 vols. 1901–11), *Diplomatie und Weltkrieg* (1920: trans. 1921).

André, JOHN, an accomplished British officer during the American Revolutionary War, chiefly remembered for his connection with the treason of the colonial general, Benedict Arnold (q.v.), was born in London in 1751. His father was a merchant from Geneva, and his mother (*née* Girardot), though a native of London, was of French descent. Young André distinguished himself at the university of Geneva. On his father's death in 1769 he assumed the management of the business, but soon procured a commission, and in 1774 joined his regiment, the Royal Fusiliers, in Canada. He was captured at St John's by the colonial forces, was exchanged the following year, and became aide-de-camp successively to General Grey and Sir Henry Clinton, receiving from the latter (in 1780) the appointment of adjutant-general, with the rank of major.

During the British occupation of Philadelphia in 1777–78, André appears to have been particularly intimate in the family of Edward Shippen, whose daughter afterwards became the wife of General Benedict Arnold. When in 1780 the latter obtained the command of West Point, André was selected by Clinton to consummate the arrangements with Arnold for the betrayal of that post. A meeting between the conspirators was agreed upon, and on the night of 20th September 1780, Major André embarked on board the sloop of war *Vulture*, and proceeded to the rendezvous, some 35 miles up the Hudson, near the hamlet of Haverstraw. The place of meeting was on neutral ground in a thicket near the bank of the river, and thither at midnight André was conducted by a trusty friend of Arnold, one Joshua H. Smith, a resident of the vicinity. Failing to finish their business during the night, they repaired in the morning to Smith's house, within the American lines, whence, at the termination of their interview, Arnold departed for his headquarters, having first furnished André with a pass through the American lines (as Mr John Anderson), and papers containing the plan for the surrender of West Point. The fatal mistake of accepting and retaining these papers on his person was in direct disobedience to Clinton's instructions. Concealing the papers in his stockings, André, accompanied by Smith and a negro servant, set out on his return to New York; but Smith, fearing to attempt to get him on board the *Vulture*, decided that the journey must be made by land. They crossed the Hudson at King's Ferry, spent the night within the American lines, and parted in the morning, Smith to return home, and André, mounted on a horse, to pursue his dangerous journey alone. As André neared the British lines, he was halted by an armed band. He declared

himself a British officer on important business, and demanded permission to proceed. To his consternation his captors (one of whom wore a Hessian coat) proved to be ardent partisans of the colonists, and although André finally produced the pass given him by Arnold, their suspicions were so thoroughly aroused that they conducted him back within the American lines and delivered him to the military authorities.

The papers found upon his person clearly established his character as a spy, and a military board convened by Washington declared that 'agreeably to the laws and usages of nations he ought to suffer death.' Washington approved the finding of the board, and André was sentenced to be hanged. At the earnest solicitation of the British commander, the execution was stayed for a day on the plea that the board 'had not been rightly informed of all the circumstances;' but at an informal meeting with the president of the board he failed to adduce any sufficient reason for a commutation of the sentence, and André was accordingly hanged at Tappantown, 2d October 1780. He was buried near the place of execution. A monument to him was erected in Westminster Abbey by order of the king, and thither his remains were brought in 1821.

See his Life by Winthrop Sargent (1861; new ed. 1902); his *Journal* (1904); Trevelyan, *George III. and Charles Fox* (vol. i. 1912); books by Joshua H. Smith (1808) and Benson (1817); the Lives of Benedict Arnold (q.v.); Lossing, *The Two Spies* (1886).

Andreä, JOHANN VALENTIN, born in 1586 near Tübingen, became a Protestant pastor, and died in 1654 at Stuttgart, where he was chaplain to the court. His writings are remarkable for wit and humour, acuteness and moral power. He was long regarded as the founder or restorer of the order of the Rosicrucians (q.v.), a view based on his misunderstood *Chymische Hochzeit Christiani Rosenkreuz* (1616)—really meant to ridicule the follies of the age, Rosicrucianism included. He wrote mainly in Latin, but also in the Swabian dialect. Among his works are his *Menippus* (1617) and his *Geistliche Kurzweil* (1619).

Andrea del Sarto. See SARTO.

Andree, SALOMON AUGUST, Swedish engineer, born in 1854, was examiner to the Patents Office when in 1897 he undertook a balloon voyage to the North Pole, and was never again heard of.

Andreëff (or ANDREYEV), LEONID (1871–1919), born at Orel, suffered much from poverty, hunger, and ill-health at the universities of St Petersburg and Moscow, and after attempted suicide in 1894 began to write and paint portraits. In 1897 he was called to the bar, but practised little. His stories and dramas (a number of them translated), which rank him high in Russian literature, include *Red Laughter*, *The Life of Man*, *To the Stars*, *Vasily Fiveisky*, *Eliazar*, *Black Masks*, *The Seven who were Hanged*, *Judas Iscariot*, and *S.O.S.*

Andréossy, ANTOINE FRANÇOIS, COUNT (1761–1828), was born at Castelnaudary, in Languedoc. He served under Bonaparte in Italy and Egypt and on the 18th Brumaire, and was ambassador at London, at Vienna, and at Constantinople, whence he was recalled at the Restoration. He was raised to the peerage by Napoleon after his return from Elba. After the battle of Waterloo, he advocated the recall of the Bourbons; but as deputy he generally took part with the opposition. He died at Montauban. He was a man of eminent scientific attainments, one of his earliest works being the *Histoire Générale du Canal du Midi*. Besides his scientific works, he wrote several military *Mémoires*.

Andrew, the first disciple, and one of the apostles of Jesus. His career after the Master's death is unknown. Tradition tells us that, after preaching the gospel in Scythia, Northern Greece, and Epirus, he suffered martyrdom on the cross at Patræ in Achaia, 62 or 70 A.D. The anniversary of *St Andrew* falls on November 30. About 740 St Andrew became the patron saint of Scotland (see the article ST ANDREWS); and he is held in great veneration in Russia, as the apostle who, according to tradition, first preached the gospel in that country.

CROSS OF ST ANDREW.—A white saltire on a blue ground, to represent the ×-shaped cross on which the patron saint of Scotland suffered martyrdom, has been from an early date adopted as the national banner of Scotland. It is combined with the crosses of St George and St Patrick in the Union Jack (see FLAG). The Scottish Order of the Thistle (q.v.) is sometimes known as the Order of St Andrew.

THE RUSSIAN ORDER OF ST ANDREW was the highest in the empire, and was founded by Peter the Great in 1698. It had but one class, and was confined to members of the imperial family, princes, and persons of the rank of general who already held two other important orders. The badge of the order shows on the obverse the double-headed eagle, crowned, on which is a St Andrew's Cross enamelled in blue, with a figure of the saint.

Andrew, JOHN ALBION, an American statesman, was born at Windham, Maine, in 1818, studied law, and was admitted to the bar at Boston in 1840. Distinguished for his opposition to slavery, he was elected a member of legislature by the republicans of Boston in 1858; in 1860 he became governor of Massachusetts, and was four times re-elected, retiring in 1866. He acquired great popularity by his attention to the wants of the soldiers in the field, for his fervid eloquence and patriotism during the war, and his zeal for the liberation and the arming of the negroes. He died October 1867.

Andrewes, LANCELOT, was born at All Hallows Barking, in London, in 1555, and educated successively at the Coopers' Free School in Ratcliffe, at Merchant Taylors' School, and at Pembroke Hall, Cambridge, of which college he was in 1576 elected fellow. Taking orders in 1580, he accompanied the Earl of Huntingdon to the north; and in 1589, through Walsingham's influence, he was appointed a prebendary of St Paul's and Master of Pembroke Hall. In 1597 Elizabeth made him a prebendary, and in 1601 dean, of Westminster. He rose still higher in favour with King James, who was well qualified to appreciate his extensive learning and peculiar style of oratory. He attended the Hampton Court conference, as one of the ecclesiastical commissioners, and took part in the translation of the Bible. In 1605 he was consecrated Bishop of Chichester; in 1609 he was translated to Ely, and appointed a privy-councillor, both for England and Scotland. To the latter country he accompanied the king in 1617, as one of the royal instruments for persuading the Scots of the superiority of episcopacy over presbytery. In the following year he was translated to Winchester; and he died 25th September 1626. A zealous High Churchman, Andrewes was, with the exception of Usher, the most learned English theologian of his time. As a preacher, he was regarded by his contemporaries as unrivalled; but the excellent qualities of his discourses are apt to suffer much depreciation in modern judgment from the extremely artificial and frigid character of the style. His principal works published during his life were two treatises in reply to Cardinal Bellarmine, in defence of the right of princes over ecclesiastical assemblies.

These, with sermons and manuals of devotion, fill 8 vols. of the *Library of Anglo-Catholic Theology* (1841–54). See Lives of him by A. T. Russell (1863), R. L. Ottley (1894), and D. Macleane (1910).

Andrews, THOMAS, physicist, was born in Belfast, 19th December 1813, and studied chemistry and medicine at Glasgow, Paris, Edinburgh, and Dublin. He practised as a physician at Belfast, where in 1849 he was appointed professor of chemistry in the Queen's College. F.R.S. and LL.D., he resigned his chair in 1879, and died 26th November 1885. His brilliant researches were more of a physical than of a chemical nature, being on the heat of combination of various classes of substances, on the nature of ozone, on the conducting power for heat of the various gases, and on the continuity of the liquid and gaseous states of matter. See his *Scientific Papers*, edited, with a memoir, by Profs. Tait and Crum Brown (1889).

Andria is a city of South Italy, 30 miles W. of Bari, with a fine cathedral (1046; burned in 1916), and a trade in almonds. Pop. 59,000.

Andrieux, FRANÇOIS GUILLAUME JEAN STANISLAS, a French scholar and dramatist, born at Strasburg, May 6, 1759. He began life as an advocate and promising politician, but his political career was cut short by Bonaparte, and he turned to literature as a calling. On the restoration in 1814, he was appointed to a chair in the Collège de France, was admitted to the Academy two years later, and made perpetual secretary in 1829. He died May 10, 1833. Of his many comedies, the best are *Les Étourdis* (1788) and *La Comédienne* (1816). He wrote also a tragedy, *Junius Brutus*, and numerous poems, full of grace and spirit, in the form of fables, tales, romances, and epistles.

Androclus, a Roman slave of the early part of the 1st century, the hero of a well-known story related by Aulus Gellius. Having attempted to run away from his master, he was sentenced to be torn by wild beasts in the circus, but to the amazement of the spectators, the lion when let loose rushed up to him and began to lick him fondly. On inquiry it was found that he had once pulled a thorn out of a lion's foot in a cave in Africa, and that the grateful beast had at once recognised in him his benefactor. Androclus was pardoned by the emperor, and afterwards led the lion about the streets of Rome.

Andro'gynous (Gr., 'male-female'), an almost obsolete term applied (1) to plants where the inflorescence is *monœcious*—i.e. consists of distinct male and female flowers; and (2) to animals which are *hermaphrodite*—i.e. possess a distinct male and female generative system in the same individual. This is the case with very many of the lower animals, but is not inconsistent with a necessity for the co-operation of two individuals in the propagation of the species. See REPRODUCTION, HERMAPHRODITISM.

Androm'ache, the wife of Hector, was the daughter of Ëëtion, king of the Cilician Thebes, and is one of the finest female figures in Homer's *Iliad*. During her childhood, Achilles slew her father and her seven brothers. By Hector she had a son, Scamandrius (Astyanax). Her love of her husband is pathetically depicted in her address to the hero on his going to his last battle, and her lamentation over his death. After the fall of Troy, she was given into the hands of Pyrrhus (son of Achilles), who took her away to Epirus, but afterwards surrendered her to Helenus (Hector's brother), by whom she had a son named Cestrinus. Andromache is the heroine of one of the tragedies of Euripides.

Androm'eda, daughter of the Ethiopian king Cepheus and Cassiopeia, like her mother, remarkable for her beauty. Cassiopeia having been rash enough to boast that her daughter was more beautiful than the Nereids, these offended deities prayed Poseidon (Neptune) to revenge the insult. Accordingly, the territory of King Cepheus was devastated by a flood; and a terrible sea-monster appeared, whose wrath the oracle of Ammon declared could only be appeased by the sacrifice of Andromeda. She was fastened to a rock, and left as a prey to the monster, when Perseus, returning from his victorious battle with Medusa, saw the beautiful victim, and determined to rescue and win her. Having slain the sea-monster, he received Andromeda as his reward. Athena gave Andromeda a place among the constellations. Her story is told in fine English hexameters by Charles Kingsley.

Andromeda, a genus of the Ericaceæ. See HEATH.

Androni'cus OF RHODES, a Peripatetic philosopher, lived at Rome in Cicero's time, and employed himself in criticising and explaining the works of Aristotle, a great number of which he was probably the means of preserving to us. None of the writings of Andronicus himself are extant. He must not be confounded with another Greek and Aristotelian, *Andronicus Callistos*, professor in Italy in the 15th century.

Androni'cus, the name of four Byzantine emperors.—Andronicus I., Comnenus, grandson of Alexius I., was one of the most conspicuous characters of his age, which produced no man more brave, more profligate, or more perfidious. In his youth he served against the Turks, in 1141 was for some time a prisoner, and was afterwards appointed to a military command in Cilicia, but was unsuccessful. Having engaged in a treasonable correspondence with the king of Hungary, he was thrown into prison by his cousin, the Emperor Manuel; but after twelve years he succeeded in making his escape, and reached Kiev, the residence of Prince Jaroslav. He regained the favour of his cousin by persuading Jaroslav to join him in the invasion of Hungary, and by his gallantry in that war; but soon incurred his displeasure again, and was sent in honourable banishment to Cilicia. After a pilgrimage to Jerusalem, and his scandalous seduction of Theodora, the widow of Baldwin, king of Jerusalem, he settled among the Turks in Asia Minor, with a band of outlaws, making frequent inroads into the province of Trebizond; but at length made his peace with the emperor, and was sent to Œnoe in Pontus. After the death of Manuel in 1182, he was recalled to become, first guardian, then colleague, of the young Emperor Alexius II. Soon after, he caused the empress-mother to be strangled, and afterwards Alexius himself, with whose youthful widow he contracted an indecent marriage. His reign, though short, was vigorous, and restored prosperity to the provinces; but tyranny and murder were its characteristics in the capital. At last, a destined victim, Isaac Angelus, one of his relatives, having fled to the Church of St Sophia for sanctuary, a crowd gathered, and a sudden insurrection placed Isaac on the throne, whilst Andronicus, now 73 years of age, was put to death by the infuriated populace, after horrible mutilations and tortures, on September 12, 1185.—For other monarchs of the name, see BYZANTINE EMPIRE.

Andronicus, LIVIUS. See LIVIUS ANDRONICUS.

Andropo'gon. See GRASS-OIL.

Andros, an island of the Greek Archipelago, the most northern of the Cyclades, separated from Eubœa by a channel, the Doro Channel, 6 miles broad. The island is 25 miles long, and about 10 miles in its greatest breadth, the area being 156

sq. m. Its eastern coast is very irregular. It is mountainous, and on some of its mountains snow lies during great part of the year. The soil is remarkably fertile, and wine, silk, olives, and lemons are produced. The population is about 18,000. The chief town, Andros, is situated on a bay of the eastern coast. It has a little harbour, and about 2000 inhabitants.—ANDROS is also the name of one of the Bahamas (q.v.).

Andújar, a town of Andalusia, Spain, in the province of Jaén, on the right bank of the Guadalquivir, at the base of the Sierra Morena, 48 miles ENE. of Córdoba by rail. The river is crossed by a bridge of seventeen arches. The town is noted for the manufacture of porous cooling clay water-vessels. The Convention of Bailén was signed here on 23d July 1808. Pop. 17,000.

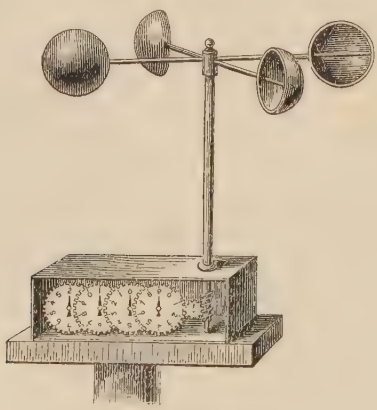
Anecdote (Gr. *an-*, 'not,' and *ekdotos*, 'published'), a narrative of any single incident or fact of an interesting nature. The term in earlier times meant only private or hitherto unpublished narratives or details of history, from its use by Procopius, by whom it was applied to his '*Unpublished* Memoirs' of the Emperor Justinian, consisting chiefly of tales of the private life of the court.

Anega'da, the most northerly of the Virgin Islands, lying east of Porto Rico in the West Indies. It contains about 13 sq. m., with a scanty population of 200, and belongs to England. A little cotton is grown. The island is of coral formation, and beset with reefs; shipwrecks are now rare, thanks to the lighthouse on Sombrero.

Aneiteum. See NEW HEBRIDES.

Aneling is literally anointing (O.E. *an*, 'on,' *elien*, 'to oil;' from *ele*, 'oil,' Lat. *oleum*); in particular Extreme Unction (q.v.).

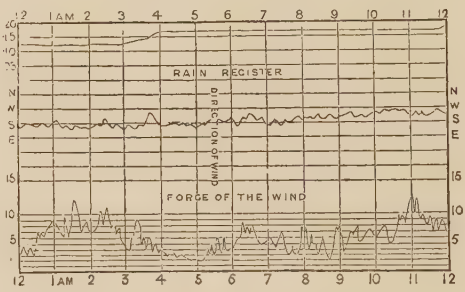
Anemom'eter (Gr. *anemos*, 'the wind,' *metron*, 'a measure'), an instrument for measuring the pressure or velocity of the wind. The simplest



Robinson's Hemispherical-cup Anemometer.

anemometer is that which is generally known as Robinson's hemispherical-cup anemometer (see fig.), invented by Dr Robinson of Armagh in 1846. It consists of four hemispherical cups fixed to the ends of two crossed metal arms and supported on a vertical axis which turns freely. The number of revolutions of the cups in a given time is proportional to the amount of wind which passes them. Careful experiments have shown that the ratio of the distance travelled by the wind to the distance travelled by the cups, instead of being indicated by 3, as used to be thought, varies between 2·2 and 2·8 according to the size of the cups and length of the arms. This is allowed for in the system of gearing, whereby the number of miles travelled by the wind is shown on a dial or series of dials.

Pressure anemometers are of very great importance in meteorological observations and for engineering purposes. Of these, one of the best known is that invented by Osler. In this instrument, the force of the wind is ascertained by means of a brass plate one foot square which is suspended by springs, and being attached to the vane of the instrument, is maintained at right angles to the direction of the wind. This plate, by the action of the wind, is beaten back upon the springs, and in so doing, causes a pencil to move backwards and forwards on a sheet of paper placed below it. This sheet of paper is made to pass under the pencil in a direction at right angles to its oscillation; and by means of clockwork, moves at a uniform rate, so that the force of the wind at any particular time of the day is recorded. A pencil in connection with



Register-sheet of an Osler's Anemometer.

the vane, and moving in the same transverse line as the former, records the changes in the direction of the wind; and usually a third pencil, guided by a rain-gauge, registers on the same sheet the quantity of rain that has fallen. The preceding sketch, taken from the first half of a daily register-sheet, gives an idea of the kind of record made by an Osler's anemometer. The space between two upright lines indicates an hour; that between two horizontal lines, in the rain-register $\frac{1}{10}$ of an inch of rain, in the direction of the wind two cardinal points, and in the force of the wind 1 lb. of pressure on the square foot.

Thus, on the day in which these lines were traced, there was in the rain-register, brought over from the former account, between ·10 and ·15 of an inch; and during the twelve hours, the pencil had only risen one space, indicating a fall of ·05, or $\frac{1}{20}$ of an inch, almost entirely between the hours of 3 and 4 in the morning, and immediately before 12 in the day. If the day had been very rainy, and the pencil had risen to the top of the register, it would have fallen immediately to the bottom of it, and begun a new account; and it might have done so several times in the course of the twelve hours. This would have been effected by the mechanism connected with the rain-gauge, which enables the gauge to empty itself each time that the pencil reaches the top of the rain-register. As regards the direction of the wind, it was, during the first six hours, south, veering slightly towards the east; and for the last six hours, it was tending decidedly towards the west, being between 10 and 11 nearly west. From the line marking the force of the wind, it will be seen that the day was stormy. Between 1 and 2, and at 11, the wind was blowing a very high gale, producing a pressure of upwards of 12 pounds on the square foot; and between the hours of 4 and 5, there was a decided lull, the wind being brisk, but not stormy (2 to 3 lb.). Both the hemispherical-cup anemometer and the pressure anemometer are equally indispensable in fully equipped observatories. The former registers only the amount of wind which passes over the place, but does not register the force

of those sudden and instantaneous gusts of wind to which storms and hurricanes owe their destructive energy. It must, however, be added that a tolerably correct means of registering the force of high winds remains yet to be found out.

The anemometer invented by W. H. Dines is especially suitable for the measurement of gusts. In it the wind, through tubes exposed to its force, acts on a recorder floating in water, which, rising and falling, indicates the varying force on a revolving sheet of paper.

All anemometers should be placed as high as practicable above the tops of tall buildings and out of reach of anything likely to influence the current; but the velocity thus obtained, it should be remembered, will be higher than at the surface of the earth. When anemometers are not available, the wind may be estimated and recorded arbitrarily without apparatus, as by the 'Beaufort Scale,' recognising 12 degrees, from a calm (3 miles an hour or less) to a hurricane (90 miles). See WIND; and references there.

Anemoné, a genus of Ranunculaceæ, characterised by the acridity prevalent in this order. The species are numerous, and generally beautiful. Most of them flower early in spring. They are natives of temperate and cold climates, chiefly of the northern hemisphere. North America has a good many native species. One, *Anemone nemorosa*, the Wood Anemone, or wind-flower, is a common native of all parts of Britain, and its white flowers, externally tinged with purple, are an ornament of many a woodland scene and mountain pasture in April and May; and it is also common in parts of North America.

Wood Anemone (*A. nemorosa*).

Another species, *Anemone pulsatilla*, the Pasque Flower, adorns chalky pastures in some parts of England at the same season. Its flowers are purple and externally silky. The Garden Anemone is a favourite florist's flower; the varieties, both single and double, are very numerous, but are chiefly traceable to two species, *Anemone coronaria* and *Anemone hortensis*, though other forms are constantly being introduced, of which *Anemone japonica* may be especially mentioned; and whole works have been published on them and their cultivation, which has long been most extensively carried on in Holland. The genus Hepatica is frequently included in Anemone. *Anemone triloba* (*Anemone hepatica*), with three-lobed leaves, is common in the Southern Alps. Varieties of different colours, and both single and double, are among the finest ornaments of our flower-borders in early spring. In cultivation, the soil around them should not be much disturbed.

Anemone, SEA, a popular name of Actinia and some allied genera of Actinozoa (q.v.). The term obviously refers to that gay flower-like appearance which has in other countries won for these forms titles such as 'sea-roses' and the like. They occur abundantly along our coasts, attached to rocks or sometimes imbedded in sand, from low-water almost to high-water mark, and are very familiar objects both when expanded with spreading tentacles, and when contracted into a puckered conical knob. They are occasionally borne on floating objects, on the swinging seaweeds, or on other animals. Almost cosmopolitan in their distribution, they attain most magnificent development in the warmer seas, such as the Mediterranean. The sea anemone consists of a muscular tube, fixed by its expanded base, and with a rich crown of tentacles round the mouth. So far it is like a hydroid polyp, but the mouth margin is prolonged inwards to form an open stomach-cavity extending to near the base, and this inner tube is connected with the outer by vertical radiating mesenteries or membranous partitions. Not all of these mesenteries reach right across from outer wall to the stomach-tube, and below the termination of the latter they are all reduced in size so as to leave a wide basal space (see fig. 1). The chambers between the partitions communicate with one another, with the tubular cavities of the very variable tentacles, and with the general body-space. As usual, the body

Fig. 1.
A, *Anemonia sulcata*; B, *Cerianthus membranaceus*; C, *Bunodes gemmaceus* (closed); D, the same (open).

consists of an outer layer or *ectoderm*, an inner layer or *endoderm*, and a slightly developed median layer or *mesoderm*. None of the Actiniæ (*Malacodermata*) form any skeleton, but the body-wall is very thick and muscular, especially in the basal and oral regions. The outer layer of cells includes a large number of offensive elements—*nematocysts* or Thread-cells (q.v.), from which fine lassoes bathed in poison are thrown out on the least provocation, and are of great importance in numbing or killing both prey and enemies. The long uncoiled lassoes, usually much longer than the thread-cells which contained them, are too delicate to pierce the skin of the hand, but may be readily felt on cheek or tongue. Besides these, there are abundant sensitive cells scattered up and down in the outer layer, and especially frequent on the tentacles and mouth region. Externally these elements form fine hairs, which catch stimuli from the outside world, while internally they are in connection with a network of nerve fibres and cells lying beneath the skin. The *nervous system* is thus very diffuse. Developed *sense organs* are often present—e.g. round the margin of the mouth, in the form of azure spots like turquoise beads. These are apparently

rudimentary eyes. Both outer and inner layers form *muscle fibres* which lie apposed to the median sheath or mesoderm. The *mouth* is somewhat sunk below the level of the surrounding disc, and forms an elongated slit, which is occasionally constricted in the middle, so that one end serves for food coming in and the other for waste matter passing out. The mesenteries or partitions are fringed by special coiled filaments, which have been shown to digest food by taking the particles holus-bolus into their cells. The generative organs are also borne on the sides of the mesenteries, and lastly, in some genera there are long, richly ciliated, thread-like weapons, which are beset with stinging-cells, and can be protruded through special apertures in the body-wall.

Sea anemones are very voracious, and feed on numerous forms of invertebrates. Johnston relates an interesting case of a sea anemone which had contrived to swallow a valve of *Pecten maximus* of the size of an ordinary saucer, and, having become divided into two compartments by the abnormal extension, had formed a second mouth and tentacle-wreath for the lower story. 'The individual became indeed a sort of Siamese twin, but with greater intimacy and extent in its union' (*British Zoophytes*, i. 235). With the exception of a few genera, the Actiniæ never form colonies, but remain as isolated individuals. They may attain very considerable size, and though that is usually covered by a few inches, they have been found in the Chinese Sea up to three feet in diameter. The sexes are separate or united. The eggs are fertilised in the body-cavity, and the Planula-like larvæ issue by the mouth. Division may also occur in varied fashion, and buds may also be formed externally or internally. Artificial division has also been frequently performed with success. Some forms attain considerable age, as in the classic instance of 'Grannie'—a common sea anemone (*Actinia mesembryanthemum*), which was taken from the Firth of Forth by Sir John Dalyell in 1828, and which died 4th August 1887. In six years this specimen produced 276 young. Sea anemones afford beautiful illustration of the association of different organisms. Some occur constantly on certain sponges in a more or less passive partnership, while others become associated with hermit

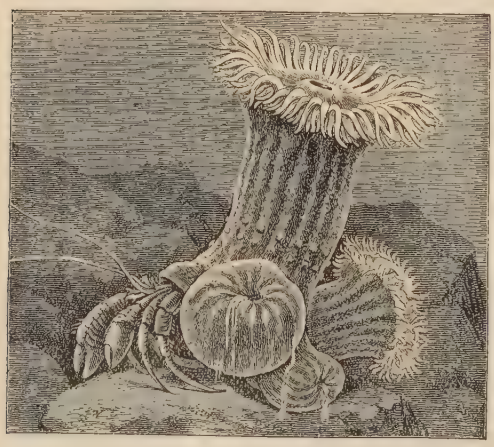


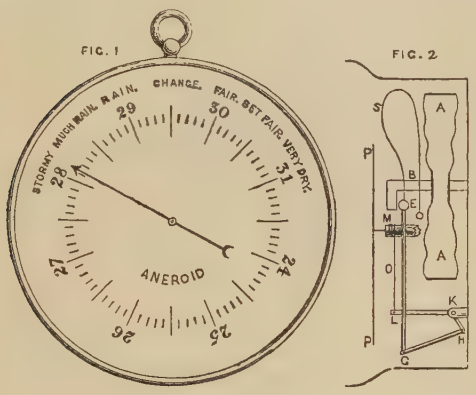
Fig. 2.—*Adamsia Rondeletii* borne by a Hermit Crab.

crabs in a close mutual union. On the one hand they are borne on the mollusc shell, or even on the claws of the hermit crab, and thus secure the advantages of locomotion, of a certain amount of protection, and of a share of the booty; while on the other hand they serve as protective organs for their bearer, and are also useful in numbing, killing, or paralysing the desired prey. Such a mutual association is termed *Commensalism* (q.v.). Again, certain small fishes are found as commensals sheltered within the cavity of various sea anemones. But an even more intimate association is exhibited in those sea anemones which contain 'yellow cells.' These elements are minute single-celled plants which thrive in mutual partnership with the animal cells of the sea anemone. The carbonic acid given off by the animal cells is as useful to the minute plants as the oxygen and starch formed by the latter doubtless are to the sea anemone. Such an association is termed *Symbiosis* (q.v.). Sea anemones in many cases readily accommodate themselves to confinement in an aquarium, within which, however, they usually try to exterminate their fellow-prisoners.

It remains to notice some representative forms. The commonest British species is *Actinia mesembryanthemum*. It is hardy and readily kept in confinement, though accustomed to move about not a little by means of its muscular basal disc. The mouth margin bears a beautiful circlet of rudimentary eyes. *Anthea* or *Anemonia cereus* is also common in the south. It bears towards two hundred long, many-coloured, very mobile tentacles. *Actinia dianthus*, a large and extremely beautiful form, inhabits deep water; and the *Challenger* expedition brought up some species from very considerable depths (see *Challenger Report on Sea Anemones*). A large genus (*Discosona*), measuring two feet across, is said to spread like a carpet over the Red Sea bottom, and even larger forms are known to occur. Some form for themselves a tubular sheath or other external protection. *Cereus crassicornis*, found abundantly on the south coasts of England, is one of the largest and most beautiful British forms, measuring about four inches in height, and fully more from tip to tip of expanded tentacles. The colour varies very greatly. A large number of forms (*Ilyanthus, Edwardsia, Peachia*, &c.) live in the sand, and have narrowed bases and elongated bodies. The best impression of the sea anemone group—apart from seeing the actual forms—is to be got by consulting the wonderfully magnificent monograph by Dr Angelo Andres, included in the series of reports on the fauna and flora of the Gulf of Naples. The *Challenger* report on the group ought also to be consulted. Abundant references will be found in these works.

An'eroid (formed from Gr. *a-*, 'not,' and *nēros*, 'wet'), the name given to a barometer invented in 1844 by M. Vidi of Paris, in which the pressure of the air is measured without the use of liquid, as in ordinary instruments. The face of the aneroid barometer, represented in fig. 1, has usually a diameter of about 5 inches, and the case behind, which contains the mechanism, a general idea of which is given in fig. 2, is about 2 inches deep. The pressure of the atmosphere acts upon a circular metal box, AA, about 3 inches in diameter, and $\frac{1}{4}$ of an inch deep, which has been nearly exhausted of air, and then soldered air-tight. The sides are corrugated in concentric rings, so as to increase their elasticity and strength, and one of them is fixed to the back of the brass case which contains the whole. The amount of exhaustion is such that if the sides of the box were allowed to take their natural position, they would be pressed in upon each other, and to prevent this they are kept distended, to a certain extent, by a strong spring, S, fixed to the case, which acts upon the head of the stalk, B, attached to the side next the face. When the pressure of the air increases, there being little or no air inside the box to resist it, the corrugated sides are forced inwards, and when it diminishes again, their elasticity restores them to

their former place; and thus the little box becomes a spring extremely sensitive to the varying pressure of the external atmosphere. Supposing the two



Aneroid Barometer.

sides pressed inwards, the end of the spring, E, will be drawn towards the back of the case, and carry with it the rod, EG, which is firmly fixed into it. EG, by the link GH, acts on the bent lever, HKL, which has its axis at K, so that, while the arm, KH, is pushed to the right, LK is moved downwards. By this motion, a watch-chain, O, attached at L, is drawn off the little drum, M, and the index-hand, PP, which is fixed to it, would move from the position represented in fig. 1 to one towards the right. When the contrary motion takes place, a hair-spring moves the drum and the hand in the opposite way. By this mechanism, a very small motion of the corrugated sides produces a large deviation of the index-hand, $\frac{1}{210}$ of an inch causing it to turn through 3 inches. The aneroid barometer is graduated to represent the inches of the mercurial barometer. Both from its small size and construction, it is extremely portable, and consequently a very useful instrument; but from its liability to change from time to time, it must be frequently compared with a good mercurial barometer. The 'Metallic Barometer' of M. Bourdon is a modification of the aneroid principle. See BAROMETER.

Aneurin, a Welsh poet (603), who, according to the received account, was the son of Caw ab Geraint, chief of the Otadini. Some have, however, identified him with Gildas, the British historian; whilst Mr Stephens makes him Gildas's son. After being educated at St Cadoc's College, at Llancarvan, he joined the bardic order; was present at the battle of Cattraeth as bard and priest, and in his poem *Gododin*, he mentions the hardships he endured as a prisoner. When released, he returned to Llancarvan, where it is believed he secured the friendship of a brother poet, Taliesin. In later life he lived with his brother, Nwython, in Galloway, and is said to have perished at the hands of Eidyn ab Einygan. His epic poem, the *Gododin*, which in its present form contains more than 900 lines, tells of the defeat of the Britons of Strathclyde by the Saxons at Cattraeth, but it has been found impossible to gain from it a satisfactory account of the British defeat, owing to the obscurity of the language and the difficulty of interpretation. Edward Davies asserts that the subject of the poem is the massacre of the Britons at Stonehenge in 472 A.D.; while Mr Stephens fixes the date of Cattraeth as 603, identifying it with the battle of Degstan or Dawstane in Liddesdale. Aneurin is also said to have written twelve stanzas on the Months. The *Gododin* was published with an English version and notes in 1852, by Rev. J. Williams ab Ithel, and the text appears with a translation in W. F. Skene's *Four Ancient Books of Wales* (1866). The Cymmrodorion Society published, in 1885, an edition, with translation, by Thomas Stephens.

An'eurism (Gr. *aneurysma*, 'a dilatation') is a tumour containing blood, and communicating with the cavity of an artery. The sac of an aneurism may be formed in the first instance by one or more of the tunics of the vessel greatly stretched and thinned, generally the outer one, the two inner having given way. This is called a *true* aneurism, in contradistinction to the *false*, in which the sac is formed of cellular tissue condensed by the process of repair after a wound has been inflicted on the artery from without. Should the inner coat give way suddenly the blood may escape along the vessel between the coats (*dissecting aneurism*). True aneurism is almost always a result of Atheroma (see ARTERIES, Diseases of), and is most common in middle life. Aneurisms prove fatal by their pressure on some important part, or by bursting and allowing a sudden escape of blood. They are cured by the deposit, within the sac, of fibrin from the blood—a result the surgeon can promote by obstructing the artery above the aneurism by compression or by ligature; applying the latter close to the sac, if the aneurism is of the 'false' variety, but at a distance if it is the result of disease, or by electrolysis by means of needles introduced into the sac, or by passing into it a coil of fine wire. Internal aneurisms are treated by those remedies which moderate the heart's action, especially iodide of potassium, in conjunction with an abstemious and tranquil mode of life.

Very minute (or *miliary*) aneurisms are sometimes found in the arteries of the brain, a condition which may lead to apoplexy.

Arterio-venous aneurism is the name applied to the communication of an artery with a vein, either directly (aneurismal varix), or through an intervening aneurism (*varicose* aneurism). This condition is almost always the result of a wound injuring both artery and vein, and was at one time not uncommon as a consequence of bleeding being performed by non-professional persons. *Cirsoid* aneurism, and aneurism *by anastomosis*, are names given to a rare disease, which consists in great dilatation, elongation, and tortuosity of the arteries affected.

Angara, a tributary of the Yenisei (q.v.).

Angeioleuci'tis. See ADENITIS.

Angel. Angels (Gr. *angeloi*, 'messengers') are a class of spiritual beings who appear in the Bible as the attendants of God, and especially as his messengers, and the medium of communication between him and men. (1) In the earlier historical books, the angel has sometimes no apparent form, but is only a voice, as it were; sometimes there is a form undistinguishable from that of an ordinary man, except by the conduct (Gen. xviii. xix.), although elsewhere at times there is something in his aspect that betrays the heavenly messenger (Judges, xiii. 6). The personality of the angel is completely overshadowed in his function; still he has a certain superhuman reality. But in any case he is simply the mouthpiece of God, so that in many passages 'the angel of God' is synonymous with 'God.' At the same time, the angel who specially represents God's presence to his people is distinguished from other angels who but carry out particular commissions. The distinction between the 'angel of the Lord,' who speaks in all things with full divine authority, and the subordinate angels, is based upon such passages as Gen. xviii.; Ex. xxxii. 34, and xxxiii. 2;

Is. lxiii. 9; and Gen. xlviii. 16. The belief that the special 'angel of the Lord,' as distinguished from created angels, was the *Logos* or second person of the Trinity, and that his appearance foreshadowed the incarnation, is still held by many theologians, but seems unknown to the Old Testament writers. (2) In the poetical and prophetic books, to the name of messengers are added new titles, as 'sons of God,' 'Saints,' or 'Holy Ones;' but they continue to discharge the same duties. (3) To express the majesty of the Almighty and his power in executing his will, the poetic imagination not only conceived of the angels as existing in vast numbers, but ascribed to them a certain warlike character. They are 'the sons of the Mighty,' who appear in war-chariots and form the army of God. Jehovah descends to battle with his hosts, and enters Zion in triumph amidst myriads of heavenly war-chariots. (4) The belief in guardian angels is merely a particular phase of the general idea. Israel has a special angel guide (Ex. xiv. 19, xxiii. 20); at a later period Michael is named their 'great prince' (Dan. xii. 1). Individuals also have their special guardian angels, whose sympathy and help they enjoy, and who joy or grieve with their joys and griefs (Matt. xviii. 10; Luke xv. 7, 10). It was believed that they sometimes assumed the form of their charge, becoming their double, as it were (Acts xii. 15). Not, one, but an unlimited number attended on Jesus from his birth to the Ascension, were throughout his earthly life at his command, and will accompany him at his second coming. All this ministry to Jesus, as well as to the redeemed, might have been simply in obedience to the will of God; but they have also a personal interest in the success of the Gospel, and their ministry henceforth is specially connected with the work of salvation (Heb. i. 14; 1 Pet. i. 12), although they are inferior in glory to the Christian (Heb. ii. 16; 1 Cor. vi. 3). In Daniel, the 'angel interpreter' is Gabriel. Greece and Persia have special guardian angels.

A further development of the doctrine followed naturally from the idea of a host—its division into orders with chiefs, the greatest of whom are *archangels*. This idea, however natural from the analogy of an army, is a late conception, and first appears fully developed in Daniel. The ranks and classes of angels are discussed fully in the post-canonical and apocalyptic literature. In *Enoch*, cherubim and seraphim become distinct classes of angels, and new names are added to the names of the individual archangels. Angels have an important place in the Apocalypse. The seven angels (viii. 2) 'which stand before God' are Michael, Gabriel, Raphael, Uriel, Chamuel, Jophiel, and Zadkiel. The first three are the principal archangels, and in Christian art are often represented together, while the last three have never been generally recognised either in East or West. New features are the angels of the seven churches, interpreted, however, by many as mere human figures, and the association of the angels with cosmical forces—e.g. angels of fire and water (xiv. 18, xvi. 5). According to the rabbinical Jewish literature, there are 12 *mazzaloth* (signs of the zodiac), each with 30 chiefs of armies, each chief with 30 legions, each legion with 30 leaders, each leader with 30 captains, each captain with 30 under him, and each of these with 365,000 stars—and all 'ministering spirits' for Israel (cf. Heb. i. 14).

The Christian Fathers adopted to a great extent this elaborate hierarchy, adapting it to the Christian Church. The pseudo-Dionysius (4th or 5th century), in his *De Hierarchia Celesti*, gives nine orders, finding their names in the Old Testament, and in Eph. i. 21 and Col. i. 16: (1) Seraphim (q.v.), Cherubim (see CHERUB), Thrones; (2) Dominations, Virtues, Powers; (3) Principalities, Archangels, Angels. One large sect of the Jews, that of the Sadducees, rejected the belief in the existence of angels as something entirely foreign to the Mosaic system. In the later stages of revelation, a group of angels came to be represented as having fallen from their primitive condition of innocence, and taken up a position of hostility to God. Punished by being degraded from their 'first estate,' they group themselves under the kingship of Satan, and continue to employ their activity in attempting to frustrate the good purposes of God (see DEVIL). Angel-worship is specially condemned by St Paul (Col. ii. 18), probably with reference to the doctrine of the Essenes. Cf. Rev. xix. 10. Protestants agree with the Catholic and the Eastern Church in the doctrine of angels, but do not permit the asking of their aid and intercession. Many modern critical theologians find the doctrine foreign to early Jewish religion, but derived from the Persians about the time of the Babylonish captivity; it would then be a part of the wider doctrine of spiritual existences pervading nature. Angels have been favourite subjects in Christian art. They are usually represented as youthful and beautiful male figures, with wings to symbolise their rapidity, and often with harps or other musical instruments to symbolise their incessant praise of God.

See Cremer's article 'Engel' in the Herzog-Hauck *Real-Enzyklopädie* (vol. v. 1898); the handbooks of Old Testament theology by Oehler, Riehm, Dillmann; Oswald, *Angelolatrie* (1883); Mrs Jameson, *Sacred and Legendary Art*.

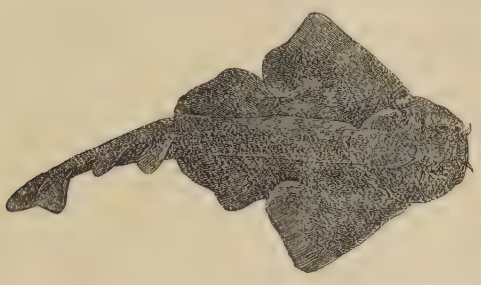
Angel, an old English gold coin, at first called more fully the *angel-noble*, because it was originally a new issue of the noble. It was so called

Angel of Edward IV.

from having upon its obverse the figure of the archangel Michael piercing the dragon. It was first coined in 1465 by Edward IV., when its value was 6s. 8d., from which it varied to 10s. under Edward VI. It was last coined by Charles I. It was the coin always presented to a person touched for the king's evil, and after it ceased to be coined, medals with the same device were substituted for it—hence called *touch-pieces*.

Angel-fish, a quaint and ugly fish belonging to the shark sub-order of Elasmobranchs. It is often called the monk-fish, and is technically known as *Rhina Squatina* or *Squatina angelus*. The body usually measures about 4 feet in length, and is of a sandy gray colour above, and a dirty white beneath. The fish is in structure nearly allied to the sharks, but resembles the skate type, not only in its general habit, but also in its somewhat flattened body, and in its large pectoral fins, which, in their wing-like expansion, have won for this form its undeserved title of *angel-fish*. The gill-slits open laterally, however, and are only slightly covered by the bases of the fore-fins. The rounded head with terminal mouth, and wide spiracles behind the eyes, is wider than the body proper, and is separated from the pectoral fins by a short neck. The pelvic fins are situated just

behind the pectorals, and there are two unpaired dorsals towards the tail. The rough skin is richly beset with placoid scales, and exhibits specially large spines down the back and round the eyes. The teeth are conical. The fish has an exceedingly strong and peculiar ammonia-like smell. It occurs abundantly in European seas, hiding in the sandy bottom, and working havoc among the flat-fish. It is pretty common and specifically identical on the Atlantic coasts of North America. The young are born alive about midsummer. The coarse flesh is said to be nourishing. The rough skin has been long used for polishing purposes, for making instrument-cases and the like, and formerly had some repute as a powder for skin-diseases.



Angel-fish.

Angel'ica, a genus of plants of the natural order Umbelliferæ (q.v.), by some botanists divided into two, *Angelica* and *Archangelica*. The species are mostly herbaceous and perennial, natives of the temperate and colder regions of the northern hemisphere. Wild Angelica (*A. sylvestris*) is a common plant in moist meadows, by the sides of brooks, and in woods in Britain and throughout many parts of Europe and Asia. The Garden Angelica (*A. archangelica* or *Archangelica officinalis*) is a biennial plant, becoming perennial when not allowed to ripen its seeds. The whole plant, and especially the root, is aromatic and bitter, with a pleasant, somewhat musky odour, and contains much resin and essential oil. The root was greatly valued in the middle ages as a specific against poisons, pestilential diseases, witchcraft, and enchantments, and was long employed as an aromatic stimulant and tonic, and in nervous and digestive ailments, but is now very little used in Britain. The root of *A. sylvestris*, sometimes substituted for it, is much weaker. The Garden Angelica was at one time also much cultivated for the blanched stalks, which were used as celery now is. The tender stalks and midribs of the leaves, candied, are still, however, a well-known article of confectionary, and an agreeable stomachic; the roots and seeds are employed in the preparation of gin and of 'bitters.' The plant is a very doubtful native of Britain, but is common in many parts of Europe, and even in Lapland and Iceland. Linnæus describes the use of the dried root in Lapland as tobacco, and of the stem as a vegetable. The roots are occasionally ground and made into bread in Norway, and the Icelanders eat the stem and roots raw with butter. *A. sylvestris* has been used in tanning, and also as a yellow dye. Several species of angelica are natives of North America. The plant was called 'Angelic Herb' because of its repute as a defence against poison and pestilence.

Angelica archangelica.

Angelica Tree. See ARALIA.

Angel'ico, FRA, the commonest designation of the great friar-painter—in full, 'Il beato Fra Giovanni Angelico da Fiesole,' 'the blessed Brother John the angelic of Fiesole.' Born in 1387 at Vicchio, in the Tuscan province of Mugello, in 1407 he entered the Dominican monastery at Fiesole, in 1436 he was transferred to Florence, and in 1445 was summoned by the pope to Rome, where thenceforward he chiefly resided till his death in 1455. Of course, his frescoes, such as have not perished, are all in Italy—at Cortona, at Fiesole, in the Florentine convent of San Marco (now a museum), at Orvieto, and in the Vatican chapel of Nicholas V. Of his easel pictures, the Louvre possesses a splendid example, 'The Coronation of the Virgin,' and the London National Gallery (since 1860) a 'Glory,' or Christ with 265 saints. One supreme aim pervades all the creations of Fra Angelico—that of arousing devotional feeling through the contemplation of unearthly loveliness. He has been styled the 'protagonist of pietistic painting;' and estimates of his paintings will vary as do estimates of monasticism. Ruskin said that 'by purity of life, habitual elevation of thought, and natural sweetness of disposition, he was enabled to express the sacred affections upon the human countenance as no one ever did before or since. . . . His art is always childish, but beautiful in its childishness.' See books on him by Miss Phillimore (1881), Douglas (1901), Edgcumbe Staley (1906), A. Pichon (1912), Hausenstein (1924).

Angellier, AUGUSTE JEAN (1848–1911), professor at Lille, was an original poet of power and accomplishment, and by his great book on Burns (1893) and other works did much to make English literature known in France.

Angeln, a district of Sleswick, between the Bay of Flensburg and the Schlei, noted for its fertility, and supposed to be the home from which came the Angles who invaded England in the 5th century. The principal place is Kappeln.

An'gelo, MICHAEL. See MICHELANGELO.

An'gelus Bell, in Catholic countries, a bell rung at morning, noon, and sunset to invite the faithful to recite the Angelic Salutation (as in Millet's picture); see AVE MARIA.

An'gelus Silesius (JOHANN SCHEFFLER; 1624–77), born at Breslau and bred a Protestant,

became a Catholic priest. His philosophy is a singular mixture of mystical pantheism and Christian morality, with a strong personal love of God. Some of his poems are in Protestant hymn-books.

Anger is displeasure or vexation accompanied by a passionate desire to break out in acts or words of violence against the cause of the displeasure; which should, of course, be a sentient being capable of feeling the infliction. Like most other emotions, it is accompanied by effects on the body, and in this case they are of a very marked kind. The arterial blood-vessels are highly excited; the pulse, during the paroxysm, is strong and hard, the face becomes red and swollen, the brow wrinkled, the eyes protrude, the whole body is put into commotion. The secretion of bile is excessive. In cases of violent passion, and especially in nervous persons, this excitement of the organs soon passes to the other extreme of depression; generally, this does not take place till the anger has subsided, when there follows a period of general relaxation. The original tendency to anger differs much in individuals according to temperament; but frequent giving way to it begets a habit, increases the natural tendency, and leaves its traces on the countenance. Anger is, often at least, prejudicial to health. It frequently gives rise to bile-fever, inflammation of the liver, heart, or brain, or even to mania. These effects follow immediately a fit of the passion; other evil effects come on, after a time, as the consequence of repeated paroxysms—such as paralysis, jaundice, consumption, and nervous fever. The milk of a mother or nurse in a fit of passion will cause convulsions in the child that sucks. The controlling of anger is a part of moral discipline. In a rudimentary state of society, its active exercise would seem to be a necessity; by imposing some restraint on the selfish aggressions of one individual upon another, it renders the beginnings of social co-operation and intercourse possible. See EMOTIONS; also Darwin, *The Expression of the Emotions in Man and Animals* (1872).

Angermanland, a former division of Sweden, now chiefly comprised in the government of Westernorrland, extends along the Gulf of Bothnia, and is watered by the river Angerman. It exhibits great variety of wild and beautiful landscape, and is one of the best cultivated districts in Sweden. The river Angerman, 200 miles long, is, in its lower course, navigable for large ships. The chief town of the district is Hernösand (pop. 10,000).

Angermünde, a town of Prussia, on Lake Münde, 43 miles NE. of Berlin by rail, with an iron-foundry and some miscellaneous manufactures; pop. 8000.

Angers (the ancient *Juliomăgus* or *Andegavum*), formerly the capital of the duchy of Anjou, and now of the French department of Maine-et-Loire, is situated on both sides of the navigable river Maine, not far from its junction with the Loire. It lies almost midway between Nantes and Tours, and is 214 miles SW. of Paris by rail. Angers is the see of a bishop, and was the seat of a university founded in 1246, abolished in 1685; and it had a military college, at which the Earl of Chatham and the Duke of Wellington received part of their education. David the sculptor and Chevreul the chemist were natives. It has also a theological seminary, a medical school, lyceum, a botanical garden, a large picture-gallery, and a public library. The ancient castle of Angers, built by St Louis, stands on a projecting rock above the river. The cathedral is a fine building of the 13th century. Sail-making, wool and cotton spinning, and weaving are carried on, besides a trade in corn, wine, and garden produce. The neighbouring slate-quarries employ many men. Pop. 86,000.

Angerstein, JOHN JULIUS (1735–1823), a London underwriter, of Russian origin, whose collection of paintings, bought in 1824, formed the nucleus of the National Gallery.

Angina (Lat. *an'gĭna*, 'quinsy;' but the term is usually pronounced *angī'na* in England) is any form of choking throat affection (see QUINSY). In medical parlance it is customary to append an adjective specifying the nature of the affection; thus *Angina rheumatica* is rheumatic sore throat.

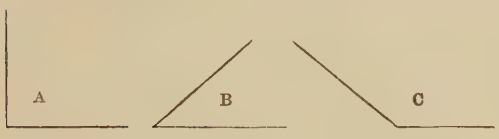
Angina Pec'toris, sometimes called Heart-stroke or Breast-pang, is characterised by intense pain, accompanied by a sense of constriction, which occurs in paroxysms, beginning at the breastbone and radiating thence in different directions, but chiefly towards the left shoulder and arm. It causes extreme dread, which is shown in the countenance of the sufferer; the face becomes pale and drawn, and the extremities are cold; there is a feeling of impending suffocation, and yet the breathing is shallow, for the patient fears to make any movement, and remains in a fixed position, lest he should add to his distress; in many instances the pulse is small and hard. The attack gradually passes away, or may end in syncope, which is sometimes fatal. There are at times premonitory symptoms, such as nausea or faintness, but usually these are absent. It may appear without any apparent exciting cause, but more commonly the paroxysm follows some unwonted strain on the system, as, for example, excess in eating or drinking, muscular exertion, and mental emotions.

Angina Pectoris is associated with many different morbid conditions, amongst the more common being inflammations and degenerations of the heart and aorta, diseases of the valves, and of the nutritive arteries of the heart; in other cases it seems to be due to neuralgia, resulting from interference with the cardiac nerves by degenerative changes in the coronary vessels which accompany these nerves; in others, again, it may be induced by want of nutrition of the heart and its nerves through the diminished blood-supply caused by calcification of these coronary vessels. It has been noticed that the pulse is small and hard—that is, it is of high pressure—in many cases, and this speaks of a condition of tonic contraction of the arterioles. However produced, the pain originates in the terminal branches of the cardiac plexus of nerves, and is thence conducted by the sympathetic and pneumogastric nerves to the centres of sensory perception, from which it is referred to the associated areas of the shoulder, left arm, &c., in which the pain, therefore, appears to originate. The treatment of this disease requires before all else that the patient should shun excesses of every kind, and avoid over-exertion of body or undue mental excitement. During the attack it is absolutely necessary to adopt measures which will promptly relieve the suffering, and amongst such means the most useful and immediately necessary is the inhalation of nitrite of amyl, which in cases associated with high blood-pressure acts like a charm by dilating the arterioles. In cases where the seizure lasts a long time, the inhalation of ether or chloroform or the hypodermic injection of morphia gives relief. During the intermissions, the administration of the bromides and iodides has proved useful, and in cases where the tension tends to rise nitro-glycerine should be given, as it acts in a similar manner to nitrite of amyl, but more slowly and continuously. It is a matter of importance for the patient to have the necessary remedies at hand, and he should invariably carry small glass capsules containing nitrite of amyl for inhalation as necessary.

Angiosperms (Gr. *angeion*, 'a vessel,' and *sperma*, 'seed'), a term applied to Monocotyledons and Dicotyledons, in contrast to Gymnosperms (Conifers, Cycads, &c.). The distinction emphasised is that in angiosperms the ovules or future seeds are inclosed in a closed ovary, and fertilised through the medium of a stigma, while in gymnosperms the ovule is naked, and the pollen is applied directly to its surface. See OVULE.

Angkor. See CAMBODIA.

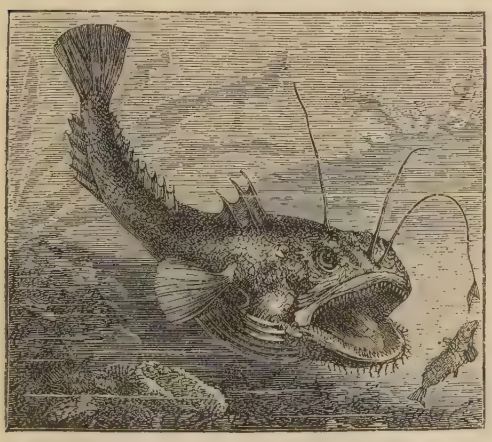
Angle, in Geometry, the inclination of two lines that cut or meet one another. If the lines are straight, the angle is *rectilinear*. The magnitude of an angle depends, not upon the length of the lines or legs, but upon the degree of their opening. If the legs are supposed closed, like a pair



A, right angle; B, acute angle; C, obtuse angle.

of compasses, and then gradually opened till they come into one straight line, they form a series of gradually increasing angles; when half-way between shut and straight, they contain a *right* angle. Any angle less than a right angle is called *acute*, and one greater is called *obtuse*. Angles are measured by degrees, of which a right angle contains 90. The angle made by two curved lines (*curvilinear*) is the same as the angle made by the tangents to the two curves at the point of intersection. Angles made by planes with one another can also be reduced to rectilinear angles. When three or more planes meet at the same point, the angular space included between them is called a *solid* angle.—For the *facial angle* of Camper, see SKULL.

Angler (*Lophius piscatorius*), a fish not uncommon on British shores, and sometimes called the *Fishing-frog*, sometimes, from its ugliness and voracity, the *Sea-devil*. It usually measures three feet or more in length. The head is enormously large, depressed, and spinous; the mouth is of



Angler-fish.

similar proportions (whence the Scottish name *Wide Gab*), and furnished with many sharp curved teeth, and with numerous worm-like lip-processes or barbules. The lower jaw is considerably longer than the upper. The body is narrow in comparison with the great breadth of the head, and tapers rapidly to the tail. The whole fish is covered with a loose skin, almost without scales. There are two dorsal fins, which are spinous, and three anterior rays, regarded as belonging to the first dorsal, and freely articulated to the head, which are with great probability supposed to serve the animal as delicate organs of touch. The nostril tube is elongated into a membranous stalk, capable of spreading out like a cup at the upper end, and of being moved in every direction by a very numerous set of muscles; the bottom of the cup being divided into projecting leaflets, on which the olfactory nerve is finally distributed. The angler lives very much along the bottom, and, like the angel-fish, is said to attract its prey by dislodging worms from the sand. The dorsal filaments on the back of the head have been credited with attractive functions from before the time of Aristotle. The fish is exceedingly voracious, scores of undigested herrings, &c. having been frequently found in a single stomach. It is common in all North Atlantic coast waters. Other species are known in Mediterranean, Pacific, and South Atlantic waters. — The genus Lophius belongs to the order Acanthopterygii, and to the family Pediculati, remarkable for the elongation of the carpal bones, so as to form a distinct wrist, to the extremity of which the pectoral fin is articulated. By means of this development, these fishes are able to leap up suddenly to seize the prey which they observe above them; and some of them can hop about upon seaweeds or mud from which the water has retired. They do not suffer so quickly as most other fishes from being out of the water, their gill-opening being very small, and an angler has been often known to devour flounders or other fish which have been caught along with it. Most of the Pediculati are tropical.

Angles (*Angli*), a German tribe who occupied the country still called Angeln (q.v.), on the east of the Elbe, between Sleswick and Flensburg. Along with the Saxons and Jutes, they passed over in great numbers to Britain during the 5th century, and settled in East Anglia, Northumbria, and Mercia. Together with their kindred races, they formed the powerful people who came to be known as the Anglo-Saxons (q.v.). From them England derives its name (Lat. *Anglia*, Anglo-Saxon, *Engla-land*). After these migrations from Sleswick, the Danes from the north entered the deserted districts, and mingled with the Angles who remained there.

Anglesey, or ANGLESEA (Norse *Önguls-ey*, 'the island of the strait'), an island and county of Wales, on the north-west coast of that principality, being separated from the mainland by the Menai Strait (q.v.), which is spanned by the suspension bridge (1826) and by the tubular bridge (1850). Its form is that of an irregular triangle, the base facing the mainland. The extreme length of the island is 21 miles; its extreme breadth, 19; the coast-line measures about 80; and its area is 276 sq. m., or 176,630 acres. The climate is mild but foggy, especially in autumn; the soil, generally a stiff loam, varying with sandy and peaty earth; the general aspect of the island, flat and uninteresting, there being very little wood. The prevailing rock is mica schist; limestone ranges traverse the county; granite, marble, coal, serpentine, and soapstone are also found. The island is rich in minerals; the Parys and Mona copper-mines, near Amlwch, were opened in 1768. Lead ore, containing much silver, has also been found. The manufactures of Anglesey are inconsiderable. Agriculture, though still rather backward, has yet in recent years made considerable advance in the way of adopting means

of improvement. Increased attention has also been given to the breeding of cattle and sheep, which latter are a white-faced, hornless breed, the largest in North Wales. Anglesey was known to the Romans under the name of *Mona*. It was one of the chief seats of the Druidical power, which in 61 A.D. was all but destroyed by the Roman general, Suetonius Paulinus. The island was again subdued by Agricola, 76 A.D. Egbert conquered it in the 9th century; but the native princes afterwards recovered their dominion, establishing the seat of government at Aberffraw. It was finally subdued by Edward I. The ancient remains consist chiefly of dolmens, two of which, side by side, are in the park of Plas Newydd, the seat of the Marquis of Anglesey. At Holyhead are the remains of a Roman camp. The county is divided into three districts, called *cantrefs*, each subdivided into two *cwmwds*. The market-towns are Amlwch, Beaumaris, Holyhead, Llangefni, and Llanerch-y-medd. The first four united in sending one member to parliament till 1885, when they were merged in the county, which returns one member. Pop. (1861) 38,157; (1911) 50,928; (1921) 51,695.

Anglesey, HENRY WILLIAM PAGET, MARQUIS OF, born May 17, 1768, from Westminster passed to Christchurch, Oxford, and sat in parliament for the Carnarvon boroughs (1790–96) and for Milborne Port (1796–1810, off and on). Entering the army, he served with distinction in Flanders (1794), Holland (1799), and the Peninsula (1808); and in 1812 succeeded his father as Earl of Uxbridge. For his splendid services as commander of the British cavalry at Waterloo, where he lost a leg, he was made Marquis of Anglesey. In 1828 he was appointed lord-lieutenant of Ireland, at a period when that country was greatly agitated on the question of Catholic emancipation; and his advocacy of that measure procured his recall by Wellington in 1829. From 1830 to 1833 he held the same office under Lord Grey's administration; but O'Connell had now commenced his career of agitation, and the Marquis was forced to resort to severe coercive measures, which destroyed his earlier popularity. To him, however, Ireland is indebted for the Board of Education. From 1846 to 1852 he was Master-general of the Ordnance in the Russell ministry; and in the former year he was raised to the dignity of field-marshal. He died April 29, 1854.

Anglia, EAST, a kingdom founded by the Angles about the middle of the 6th century, in the eastern part of central England, in what forms the present counties of Norfolk and Suffolk—names which doubtless refer to a twofold settlement now entirely forgotten. At first to some extent dependent on Kent, and afterwards on Mercia, on the fall of the latter it was attached to Wessex, without, however, losing its own kings until the time of the Danish invasion, when it was seized by the invaders, and formed into a Danish kingdom under Guthrum (878). Edward, the son and successor of Alfred, after a long struggle forced the Danes to acknowledge him in 921. Under him Wessex grew to be England, and East Anglia was henceforward part and parcel of the kingdom. It was one of the four great earldoms of the kingdom under Canute. The modern see of Norwich is equivalent in extent to East Anglia, being an incorporation that took place about the end of the 9th century of the see founded for the Northfolk at Elmham (removed first to Thetford in 1078, then to Norwich in 1101), and that founded at Dunwich for the Southfolk.

Anglican, belonging to the Church of England (q.v.) and the other churches in communion with it at home and abroad; used specially of the moderate (or non-Romanising) High Church party.

Angling is the art of catching fish by rod, line, and hook, or by line and hook, the salient feature of the pursuit being the allurement of the prey by an attractive bait. The requisites for a successful angler are, knowledge of the haunts and habits of fish, dexterity in the use of tackle, and a patience much in excess of that required for most out-of-door amusements. The first qualification covers a wide field of study, involving, as it does, familiarity with the movements of fish at different seasons of the year, and in varying conditions of water; with the food preferred by different species; and with the characteristics of the fishes angled for. Much of this may be learned from the voluminous works upon the subject, but personal observation in the essentials of the sport, which has been designated 'the contemplative man's recreation,' is absolutely necessary for mastership of an art which is no less difficult than delightful. In like manner, skill in the use of rod and line depends more upon actual experiments by the water-side than acquisition of theories published by others.

The antiquity of angling is indicated in the well-known passage by the prophet Isaiah (xix. 8), variously translated in the past, but newly rendered in the revised version as 'The fishers also shall lament; and all they that cast angle into the Nile shall mourn.' Other Old Testament writers are also claimed as witnesses to the ancient practice of fishing with hook and line. That it was known to Egyptians, Greeks, and Romans as a pastime may be gathered from inscriptions, coins, frescoes, and other relics of the remote past; and Homer and Plutarch wrote with great accuracy of detail, and some sympathy, upon fish, and the methods in vogue in their days for catching them. A reference by Martial even suggests that fly-fishing, which is sometimes supposed to be a comparatively modern accomplishment, was known to the Romans in the 2d century. Oppian in his *Halieutics* vividly and enthusiastically describes in flowing hexameters the entire process of luring, striking, and playing a fish; and from the phrase, 'Above the tugging fish the arch'd reed bends,' it may be concluded not only that the ancient angler used a rod, but that it was supple and light.

The first printed English book on angling was the second edition of Dame Juliana Berners' (or Barnes) *Book of St Albans*, in which, to a previous chapter on hawking and hunting, was added a *Treatyse of Fysshynge with an Angle*. Shortly after this publication, Wynkyn de Worde (probably in 1450) issued the angling chapter as a separate book. In 1590 Leonard Mascall published *A Booke of fishing with hook and line, and of all other instruments thereto belonging*. John Denny's poetical *Secrets of Angling* followed in 1613. Thirty-eight years later Thomas Barker's *Art of Angling* appeared, to be succeeded in two years by Izaak Walton's *Complete Angler*, of which over a hundred editions have been published. The number of books on angling has marvellously increased since Westwood and Satchell's *Bibliotheca Piscatoria* (1883) catalogued 3158 editions and reprints of 2148 distinct works on fish and fishing.

Modern angling is pursued under vastly different conditions from those discussed by writers of the last century; and though all the rudimentary basis of the art remains what it has been for generations, altered circumstances have produced new developments. These arise from the growing facilities for travelling; the establishment of a cheap and extensive literature, periodical and permanent; the advance of science in the direction of fish-culture and mechanical appliances; and the better condition of the people. There is scarcely a large town in England without its angling clubs; and in the cities, the artisan anglers who fish such rivers

as Thames and Trent may be counted by thousands. To conclude, therefore, that there are a thousand anglers to-day where there was one fifty years ago would not be extravagant. The waters are, as a natural result, in constant danger of overfishing, and can only be made to yield sport by systematic stocking; while the restrictive rules of societies and recent legislation have tended strongly to heighten the sportsmanlike qualities of angling, and to conserve our rivers and lakes.

The fish caught by angling in Great Britain are the Salmonidæ—such as the salmon, trout, char, and grayling; and the summer-spawners, or coarse fish—such as pike, perch, roach, chub, dace, bream, carp, barbel, tench, and gudgeon. Attempts, not always wise, are sometimes made to introduce new sporting fish into British waters; but for all practical purposes those enumerated are the game for which the angler seeks. The natural history of each species, and the special methods employed in their capture, are described in subsequent pages, under the names of the respective fishes; but there are many general principles which pertain to angling as an art, and which concern all classes of anglers in all parts of the world.

FISHING-TACKLE.—The soundest advice we can tender to the angler in the matter of fishing-tackle, is to cumber himself with as little as possible, and to see that what he uses is good, but of the simplest kind. If one might form an opinion from the bulky illustrated catalogues circulated by the tackle-makers, there is no class of sportsmen so full of fancies and crotchets as anglers; but every experienced fisherman knows that a large proportion of the pretty patented novelties are made to sell, rather than for sustained use. Much of the pleasure of angling is lost when the angler hampers himself with too much baggage. He requires a rod, line, winch, landing-net, lures, and receptacle for his fish; and should be able to carry all, and indulge in his sport, without fatigue from the burden strapped across his shoulders, and independent of assistance. As a rule, it is cheaper to buy than to make fishing-tackle; but it is most useful in case of emergencies to know how to whip a hook to gut, how to repair a broken rod, how to replace a lost ring, or how to dress an artificial fly. The tackle-book should therefore not be without a pair of small pliers, scissors, and waxed silk and thread. Having discovered the description of tackle that suits him and the branch of fishing in which he engages, the angler should not be tempted into acquisition of new-fangled gear merely because it is novel. All tackle should be carefully tested before use, and put away clean and dry after use. The habit of so dealing with it at the end of the day's sport should be a primary acquirement, from considerations alike of economy, efficiency, and comfort.

Rods depend entirely upon the branch of angling to be followed. The aim of every rod-maker should be, when suppleness is a necessity, to produce an implement as closely as possible resembling a natural growth like the bamboo, or the peeled wand used by boys in their novitiate; and, in rods where stiffness is an essential, a regularity of strength that shall produce a free balance. The heavy clumsy fishing-poles of our grandfathers are out of date, and cane rods assisted materially in the revolution, which was begun in the United States. For a while American makers were able to boast that they produced the lightest rods in the world—often, indeed, of almost toy-like elegance; but the greenheart rods for which the English and Scotch makers have always been famous hold their own to this day on the great salmon-rivers. The light and strong rod made of sections of cane, joined with perfect accuracy, and known as the split-cane rod, was, however, soon imitated by English makers, and with a success that has placed them without a master. The great cost of these rods has hitherto stood in the way of universal adoption, but there is no gainsaying their superiority in lightness combined with power. Ten guineas for a salmon rod, and four or five guineas for a trout rod, are almost prohibitive prices, when, for less than half the money, serviceable implements of greenheart, hickory, or lancewood can be obtained. A very fair rod may be purchased for a guinea; and we have amongst a costly collection, a handy little trout rod, purchased for half a guinea in Edinburgh, that was preferred to the best of them, until an accident laid it on the rack.

For fly-fishing, a spliced rod is preferred by experienced anglers, especially for salmon; but the ferrule has become almost universal for general angling. The old-fashioned practice of hollowing the butt for receiving the spare top is not to be recommended, since it weakens the rod at a critical part, and destroys the balance. The main point in selecting a rod is to choose one that fits the hand, and to pay for utility and not for ornament. The ferrules should be stopped when the rod is idle; and the bag in which the joints are kept should be suspended from a loop, to prevent the warping of the pieces. The trouble arising from the sticking together of the ferruled joints may be avoided by rubbing the brazen parts with common soap. Standing rings are now preferred, and the ring at the end of the top joint is best with a revolving centre.

Lines and Winches are very important items of outfit, and they are made in inconceivable variety. The former are of plaited silk, cotton, hair and silk, hair and gut, and horse-hair. The plaited lines are either dressed or undressed, to make them waterproof and prevent kinking; but if dressed, the process should be of the best, otherwise the cracking of the dressing will be a constant source of irritation and mischief, and the work will have to be continually repeated. Any good angling-book will give recipes of line-dressing, but amateur dressing seldom answers. Plaited silk lines, tapered down to meet and correspond with the finest gut casts, and well dressed, are much used; they are stronger, susceptible of better casting than the silk-and-hair lines, which they have supplanted, and do not retain the water. In many districts, however, the more primitive lines are still used. Lines should be unwound from the winch at the earliest moment after use, and thoroughly dried before winding up; and at the river, the first thing that should be done after the line has been drawn through the rings, previous to the putting on of the gut cast, is to subject a few yards to a test for strength, so that no weak spot may be left, to lead, perhaps, to loss of both tackle and fish. Winches are of nickel-silver, bronze, vulcanite, brass, and wood, the cheapest being the last two. The most serviceable winches (called also *reels*, and in the north of England *pirns*) are those with least mechanism. For the general exercises of angling, nothing can beat a strongly-made bronze winch with a reasonable amount of check. For the commoner practices of bottom-fishing, the Nottingham winch, made of wood, and running without any check, is popular; but without care and acquirement of the trick of handling, the line will overrun and become entangled. The line for this winch should be the soft undressed silk, which also takes its name from the town of Nottingham.

Foot-lines are the lengths of finer material attached to the line for the more complete deception of fishes. They are either of gut or single horse-hair, and are essential to fly-fishing and other

forms of angling. When used by fly-fishers, this foot-line is sometimes called a collar, and sometimes a cast, and it is generally made of gut. Occasionally, and in special districts, horse-hair casts, tapering from a twist of three to a single strand, keep their ground, it being claimed for them that they have an elastic spring, and a freedom from glitter impossible with gut. Reliable hair casts are, however, difficult to procure, and when used are invariably home-made by some local specialist. Gut must be round, even, and transparent, and should be well moistened and straightened when wanted. Three yards is the orthodox length of a cast, but less will suffice for float-fishing. Of late years difficulty has been experienced in procuring the best gut for salmon-fishing, but the process of making drawn gut insures an unlimited supply of the finest casts for trouting.

Hooks are now made with eyes, both upturned and turned down. In the nomenclature and numbering of hooks there is great confusion, the makers of Redditch and Kendal using different terms. The standard patterns are Limerick, Kendal, Kirby, Sproat, Carlisle, and Round; and one of the newest forms is the Pennell-Limerick. Although the Japanese artificial flies are made with barbless hooks, and American anglers use a hook which is called barbless, it is impossible in this respect to improve upon the familiar plan. In very olden times hooks were clumsy and ill-contrived, but the necessity of a barb was well understood; and in the South Sea Islands, the native hooks, with their rude shanks of mother-of-pearl, have a sharp-curved fork of bone, answering the purpose of a barb.

Miscellaneous gear for angling comprises the basket or bag, without which the equipment would lack its most cherished object. Whether the basket or creel is better than the bag (waterproof or the reverse) is entirely a matter of taste. Boxes of thin, polished wood, of japanned tin, and of papier-mâché, are made for those who have lost faith in the common fishing-basket of commerce; but we might be content with a roomy creel, made, not of the closely-woven French work, but of the coarser fabric of osier, manufactured in Scotland and the English provinces. The fishy smell, which is an offence to many, can be removed from bag or basket by washing with Condy's fluid mixed with warm water. The landing-net is for securing the fish which is played out, but yet too heavy to be lifted from the water bodily by the line; and the gaff is for salmon and pike too large for treatment with a landing-net, which must be small to be portable, and capable of being hitched to the strap of the basket, and carried behind the shoulders ready for use. An angler's gear, however, is regulated by the character of his sport; and other articles, when necessary, will be incidentally mentioned hereafter, in the paragraphs concerning the three main branches into which angling, as practised in Great Britain, may be divided—viz. fly-fishing, spinning and live-baiting, and bottom-fishing.

Fly-fishing is the highest form of angling, and it is applied to the most valuable of our fresh-water fish. Many sportsmen consider any other kind of fishing as unworthy of consideration, forgetting that it is the lower branches which give the greatest happiness to the greatest number of anglers. Fly-fishing for salmon comes first, the salmon being most truly described as the king of fish. No one has yet discovered, though many conjectures have been offered, what the salmon supposes the artificial fly to be. As there are no insects at all resembling the gaudy affairs of fur and feather to which the salmon rises, it can scarcely welcome it as a dainty gift from the insect world; and the most plausible theory is that the so-called artificial fly, bright with all the colours of the rainbow, and worked by jerks in the water, against or across stream, until the feathers and hackles move like the antennæ of some living creature, is seized in pure sport or from irresistible provocation. There are many problems unsolved with respect to salmon, and this is one of them. Salmon-flies vary in size from the Shannon or Tay pattern used in spring, with shank 3 inches long, to the low-water favourites scarce bigger than a trout-fly. To describe the different patterns would be to enumerate all the salmon rivers of the kingdom, since each district has its favourites. There is, perhaps, no more useful fly than the Jock Scott, originally a Tweed invention, but now tried everywhere. The Durham Ranger, Doctor, Popham, Wilkinson, Childers, Goldfinch (or Canary), and the Parson, are seldom missing from the salmon-fisher's book. Salmon-flies are sometimes, but should never be, whipped to strands of strong gut, which frays, and soon becomes treacherous at the head. The alternatives are a loop of gut, or the eyed-hook recently introduced. The salmon-rod should be from 16 to 18 feet long, according to the strength of the angler. The salmon-fly is cast across and down the pool, and worked deep or high, fast or slow, as the humour of the fish may determine.

Fly-fishing for trout is a more delicate operation. Until comparatively recent years, the fly-fisher attached two, three, or more flies to his cast, threw them lightly up or down stream, as his experience prompted, and allowed them to float naturally with the current. There are amongst trout-fishers an up-stream faction and a down-stream faction, the former using a short line and casting up the stream. By this method the angler is always behind the fish, minimises the risks of scaring, and is able to strike the hook firmly into, and not out of its mouth. This is doubtless the most scientific style when conditions are favourable. To allow the flies to drift down below is, however, easier, and in very rapid waters, is, indeed, the only way in which fishing can be carried on. The flies used are winged in imitation of the Ephemeræ and other water insects; hackled only, or so little dressed as to be termed spiders. These have their distinct uses on different streams. The latest school of fly-fishers advocate the floating or dry fly system, as practised on the crystal chalk streams of the south of England. One fly only is used, and this must be cast to float upon the surface of the stream with upright wings, in resemblance of the freshly hatched insect tribe that happens to be on the water. The custom is to cast over rising fish only, and not to work on speculation, as practitioners with the wet fly do. The justification for this system is the growing shyness of the trout; and upon choice rivers like the Itchen, Test, and Kennet, the method seems to be indispensable. On ordinary trout streams, however, flowing swiftly from hill sources, the common fashion pays best. Trout-flies are, like the larger lures for salmon, too numerous to particularise, but there are a few standard patterns that may be mentioned: Olive-dun, March Brown, Hare's Ear with Silver Twist, Red Spinner, Cow-dung, Needle-fly, Black Gnat, Red and Black Palmer, Governor, Alder, Black and Red Ants, Coachman, and Sedge. The stone-fly and May-fly (green and gray drake) are specialities, and confined to a brief season of the summer. When the rise of fly is good, the trout take it ravenously, and the largest bags of the year are then made. These insects are, however, peculiar to certain rivers, and so capriciously are they distributed that the upper half of a river will produce them while none are

hatched from the bed of the lower half. The artificial May-fly has large upstanding wings of drake, widgeon, teal, wood-duck, or Egyptian goose, with bodies of straw, india-rubber, bark, cork, and maize husk, besides the more ordinary wool and silk. The hooks are as large as those used for loch-flies in Scotland. The live May-fly and stone-fly are very killing; and north of the Trent the larva of the stone-fly, under the name of creeper, is much used.

In fly-fishing, the golden rule is to keep as far as possible away from the water, and out of sight of the fish; to make the line and fly drop lightly and straight; to strike firmly, but gently; to keep the hooked fish well in hand, and get it down stream without delay. Eyed-hooks are recommended because they may be easily carried in a small box, because there is less risk from the fraying of gut at the head of the fly, and because the angler is always sure that the gut nearest the hook will be of the size required.

Spinning and live-baiting are processes in salmon, trout, perch, and pike fishing. Spinning may be accomplished with either an artificial or natural bait, the object being to present to the predatory fish angled for a colourable imitation of one of the smaller creatures swimming away from it. Spinning ranks next to fly-fishing as a sportsman-like branch of angling. The spinning baits revolve upon a swivel, and are best worked against stream. Artificial baits are made of silvered, gilt, or painted metal, gutta-percha, and in the phantom, a capital specimen of the class, of soleskin, which is filled with water by the action of spinning. They are moulded and painted to resemble small trout, gudgeon, or dace, and made to spin by a fan protruding from each side of the head, or by a tail on the principle of the archimedean screw. The spoon bait, which is often coloured red inside, spins by reason of its convex shape, and is a most killing bait for all fish of predaceous habits. Spinning traces are of stout gut, fine steel wire, or a mixture of gimp and wire, mounted on swivels. Many anglers fail in spinning through not sinking the bait deep enough, and through spinning too rapidly. The fish to be caught often lie low, and the angler must operate as much as he can upon their level. The larger baits will serve for both salmon and pike, the smaller artificial minnows for trout and perch.

Dace, trout, gudgeon, or sand-eel of seven inches long, or minnows, if for trout-fishing, are the natural baits most suitable for spinning flights. The 'flight' is a series of triangle, double, or single hooks, whipped upon gimp for pike, and strong or fine gut for salmon and trout fishing; and it must lie along the body of the bait, and be so affixed that it will spin something near nature. The advantage of the spinning bait is that the fish may be struck on the instant of seizing it. In pike-fishing, success may often be achieved, when straight spinning does not succeed, by causing the bait to spin irregularly. The movement is termed a 'wobble' by anglers, and is supposed to suggest a wounded fish trying to escape from danger. Wood's champion spinner produces a straight spin and requires no lead, the piece of straight wire that goes into the mouth and body of the bait being sufficiently weighted, while the rotatory motion is given by flanges at the head. Pennell's flight requires the usual lead, and receives its spin from the tail strongly curved by means of a large end hook. Upon no section of fishing-tackle has more ingenuity been spent than in the invention and registering of spinning baits. It can only be said that there is a wide field of choice, and that these spinning baits are as effective in salt as in fresh water angling.

Live baits, in the parlance of anglers, are small fish, shrimps, or frogs. They must be vigorous, and should be used with snap-tackle—that is to say, with hooks so arranged that they enter the mouth of the fish, and may be extracted to enable undersized or ill-conditioned specimens to be returned to the water. They are used with float, suspended at varying depths and travelling with the stream, or upon the *paternoster*, a length of stout gut with single hooks attached to short lengths of gimp or gut. These are fastened to the foot-line by loops, and the hooks being baited, the apparatus sinks to the bottom by means of a weight at the end. The use of the gorge-hook for live baiting and trolling has long been discredited as unsportsmanlike.

Bottom-fishing is a term which is intended to express the art of angling for fish feeding on the beds of streams, and, though it is not precisely accurate, we may for expediency here adopt it. The rod for bottom-fishing is stiffer than that required by the fly-fisher; and the recreation is often sedentary. The exception is angling for trout in a clear stream with Stewart's tackle, a fine art in itself, which, strictly speaking, ought not to be included in this category. To kill a dish of trout when the water is at summer level and clearness, by ascending the stream, and deftly casting the worm upon Stewart's delicate tackle, is evidence of real proficiency in angling. No such skill is demanded in ordinary bottom-fishing, in which the shotted line is suspended by a float, and the hook, either on the bottom or at regulated depth above it, is baited with worms, maggots, caddis, bread paste, boiled wheat, rice, meal worms, or wasp grub. The once-fashionable perfumed baits are no longer believed in; but pastes sweetened with honey, or tinged with vermilion, are affected by many of the patient brethren to be met with sitting hopefully on the bank, or in the punt, waiting for a bite. Bottom-fishing is peculiarly the poor man's pleasure. Of free trout waters, save in Scotland, Ireland, and Wales, few remain; but the humble roach or perch fisher has his privileges still amongst what are called the coarse fish. The branch of bottom-fishing most directly answering to the name is that known as *legering*. With this method, the gut foot-line passes through a hole in a piece of flattened lead, and is kept in place by split shots a foot or so above the baited hook, which lies literally on the bed of the river, leaving the foot-line free to run through the weight to the limits of the small shot. Legering is principally used by barbel-fishers, but other fish are captured by it. For this amusement a hard, clean river-bed is essential. Angling is largely practised in the United States, Canada, Sweden, Norway, and Iceland. The trout and grayling streams of Germany and Austria are famous for sport. In India, the mahseer is the object of the angler's desire; in nearly the whole of the British dependencies trout have been now acclimatised.

ANGLING AUTHORITIES. — To the foregoing general remarks upon angling, we may add a recommendation of works which will initiate the angler into all the mysteries of the craft. Walton's book is ever delightful from its quaint style, pure tone, and sweet descriptions of nature. As a practical treatise on angling, it is, however, in many essentials out of date, and should not be read without modern editing. *A Book on Angling*, by Francis Francis, is still a standard authority on what we may term cosmopolitan angling.

The early years of the 20th century have been prolific of practical contributions to angling literature, written by the best modern experts, and produced in popular form. The following may be specially recommended:

The Halford Dry Fly Series, by F. M. Halford; *Fly-fishing*, by Sir Edward Grey (Haddon Hall Library); the fishing volumes of the Badminton Library edited by H. Cholmondeley-Pennell; John Bickerdyke's *Book of the All-round Angler* (4 vols.)—Game Fish, Coarse Fish, Pike, and Sea Fish; the fishing volumes of the 'Country Life' Library edited by Horace G. Hutchinson; the Angler's Library, edited by Sir Herbert Maxwell and F. G. Aflalo; Sheringham's *Coarse Fishing* (1912); the salmon, pike, and trout volumes of the 'Fur, Feather, and Fin' series; the *Encyclopedia of Sport*; *Salmon Fishing* and *Trout Fishing*, by W. Earl-Hodgson; *Minor Tactics of the Chalk Stream*, by G. E. M. Skues, *Wet Fly Fishing*, by E. M. Tod, and *A Scottish Fly Fisher*, by A. Leitch (1911); *Grayling Fishing*, by H. A. Rolt; Fennell's *Book of the Roach*, Pennell's *Book of the Pike*, Pritt's *North Country Flies*, Dewar's *Book of the Dry Fly*. In the angling literature of Scotland there are books such as *Salmon Rivers and Lochs of Scotland*, by W. L. Calderwood; *Lochs and Loch Fishing*, by Hamish Stuart; Stewart's *Practical Angler*; Stoddart's *Angler's Companion*; Colquhoun's *Moor and the Loch*; St John's *Sketches*; and *The Angler and the Loop Rod*, by Webster. Handbooks of fishing localities are the *Angler's Diary*; Watson Lyall's *Sportsman's Guide to the Rivers, Lochs, &c. of Scotland*; Regan's *How and Where to Fish in Ireland*. Thomas's *Rod in India*, Goode's *American Fishes* (N.Y. 1888), and the present writer's *Near and Far* and *Travel and Trout in the Antipodes* refer to other lands. The standard reference work on angling literature is Westwood and Satchell's *Bibliotheca Piscatoria*, with Sampson Low's supplement by R. B. Marston. See also FISHES, FISHERIES, PISCICULTURE, SALMON, TROUT, PERCH, PIKE, etc.

Anglo-Catholic is a term used of the Church of England generally, but especially of the High Church section, which claims that the national church is Catholic (as opposed to Roman Catholic), and repudiates the name of Protestant. See ENGLAND (CHURCH OF).

Anglo-Israelite Theory, an opinion as to the historical origin of the English people held by a considerable number of persons in Britain and America. They contend that the English are descended from the Israelites who were carried into captivity by the Assyrians under Sargon in 721 B.C. The Israelites were carried into Media, where they are identified with the Sacæ or Scythians, who appeared as a conquering horde there about the same time. They next swarmed westwards into Northern Europe, and became the progenitors in particular of the Saxon invaders of England. Unfortunately for the conclusion, the premises must both be questioned; and we have not yet been presented with any satisfactory proof either that the Anglo-Saxons are the Sacæ, or that the Sacæ are the Israelites. And it must not be forgotten that Scythia is much more a geographical than an ethnological term. Moreover, the so-called 'identifications,' on examination, prove to be little more than verbal quibblings on the English letter, depending for their success on the reader's ignorance of Hebrew exegesis. Thus one of the strongest is, that according to prophecy, lost Israel's location must be 'the isles.' The applicability of this to England is at once obvious. But unfortunately for the argument, the word rendered 'island' or 'isle,' is applied in the Hebrew text indifferently to any district on the sea-coast separated from Palestine by water—the shores around the Mediterranean, and the coasts of Greece and Asia Minor, as well as islands proper. Much is made of 'Jacob's stone' in the coronation chair at Westminster Abbey; of the fact that the Irish, or Canaanites, still trouble us according to prophecy; that in public worship we still pray towards the east, as if the posture was peculiar to English Christians; &c. On such feeble arguments as these, we are gravely asked to believe that prophecies which apply to all Israel relate to ten tribes only, to the complete exclusion of the two tribes represented by the Jews throughout the world at the present day. These prophecies, which have no meaning at all if not national and spiritual, are interpreted as if mundane and political, and referring to a portion only of Israel. We are told, moreover, that the well-marked physical features of the Jews are the special effect of the curse of God upon them; and when we ask for any survivals among the English of such peculiar and persistent customs as circumcision, seventh-day observance, legal uncleanness, and the like, we are told that the identity was to be lost, and that our ignorance is the best proof of the theory's being true. Of course, all evidence goes to show the impossibility of such peculiar customs and the language of a nation being so completely forgotten; and it is hardly enough for the opponents of a theory that sets at defiance all ethnological and linguistic evidence to be assured that nevertheless it is proved by a particular interpretation of Scripture assumed to be as infallible as its own authority.

The 'lost tribes of Israel' have been sought for in almost every quarter of the globe, and as one nation answered the conditions of the theory about as well as another, 'the remnants of the ten tribes were found marauding in the Afghan passes, wandering with the reindeer in Lapland, chasing buffaloes on the American prairies, or slaughtering human victims on the teocallis of Mexico.' But the enthusiasm of Rudbeck, Garcia, and Adair had at least one good result: it caused evidence about the facts of manners and customs—afterwards to be, in the hands of scientific students, of great value for the history of civilisation—to be preserved before it was lost before advancing European influences. The ten tribes delusion has now, however, sunk to a lower level than when Lord Kingsborough spent his fortune in publishing the Mexican pictures and chronicles. In spite of all the new real knowledge as to races, it has even now more votaries than ever. 'There is indeed no doubt,' says Sir E. B. Tylor, 'that this abject nonsense has a far larger circulation than all the rational ethnology published in England.'

Anglomania designates, among the French and Germans, a weak imitation of English manners and customs, or an indiscriminate admiration of English institutions. In German literature, an Anglomania was especially prevalent in the 18th century, when translations of English books became numerous, and were read with great admiration. A remarkable Anglomania prevailed in France for some time before the commencement of the Revolution, arising out of admiration of English free institutions. But another kind of Anglomania is often limited to trifles such as fashions and society manners, and in this sense is not unknown in the United States.

Anglo-Saxon Language and Literature. The term Anglo-Saxon was frequently applied, in the works of the last three centuries, to the earliest forms of the English language, up to the date of the Norman Conquest and a little later. English, in short, was described as Anglo-Saxon so long as it remained an inflected tongue, and no longer. The word, however, was never used by the people themselves who spoke that language: from the earliest times they knew themselves, collectively at least, as *Engle*, and their tongue as *Englisc* (or in Latin as Angli and Lingua Anglica). The Teutonic settlers of Southern Britain, commonly called Anglo-Saxons, were divided indeed into two main branches—one northern, the Anglians or English (in their own dialect,

Engle), who occupied the eastern coast from the Firth of Forth to the farther limit of Suffolk (see ANGLES); and one southern, the Saxons (in their own dialect, *Seaxe*), who held the portion of the island from Essex to Dorsetshire, extending inland to Oxford and the Severn valley. But even the Saxons appear from the beginning to have recognised themselves in a wider sense as *Engle* too; certainly they called their language *Englisc*, and as soon as the territory under the overlordship of the West-Saxon kings acquired a general name, it was known as *Anglia* and England. The (late) Latin forms *Angli Saxones* or *Saxones Angli* were first used on the Continent to distinguish the Saxons of Britain (*gens Anglorum, Angulcynn*) from the old Saxons of Germany (*antiqui Saxones, Ald-Seaxan*); but the later compound *Anglo-Saxones*, found not uncommonly in Latin before 1100, is, in its Anglicised form, very rare in old English books, and came into common use for the early Teutonic inhabitants of South Britain and their language, after the latter had become obsolete. It is accordingly not a compound of Angle and Saxon, in the sense that the people arose out of a union of Angles and Saxons. Freeman, Stubbs, Green, and others argue for English or Old English, now very usual in linguistic and historical works; the objection being that a distinct name for the older stage of the language obscures the continuity and suggests a misleading view of its history. But the word Anglo-Saxon still designates, in popular speech, the early inflected form of the English language, and the Teutonic element in the ethnology of Britain.

See ENGLAND, ENGLISH LANGUAGE, ENGLISH LITERATURE, and books there named; Green's *Making of England* and *Conquest of England;* Grant Allen's *Anglo-Saxon Britain;* Stopford Brooke's *Early English Literature* (1892); Sweet's *Primer, Readers,* and *Student's Dictionary of Anglo-Saxon* (1884–97); and Wright's *Old English Grammar* (1907).

The ANGLO-SAXON CHRONICLE, also called the *Saxon* or *English* Chronicle, the most venerable monument of Old English prose and earliest historical prose work in any European vernacular, is a continuous record of English history in English down till the death of Stephen. For the Chronicle there are half-a-dozen main MSS., varying in fullness and the date to which they come down; or rather seven MSS. (A, B, C, D, E, F, G) exhibit a fourfold chronicle. The entries were originally very meagre, but in Alfred's day and under his inspiration the Chronicle rose to the dignity of history. Copies of the earlier part seem then to have been made and sent to the monasteries for continuation. The Winchester Annals practically cease in 1005. The Worcester Annals were carefully kept till 1079. The Peterborough Annals were made up of those of Winchester, Worcester, and Abingdon, and continued in one hand to 1131; another hand using a more modern English carried the work on till the accession of Henry II. in 1154. Canterbury was responsible for at least one or two sections. A few poems, notably the famous ballad on the battle of Brunanburgh, diversify the plain but often vigorous prose of the story. When the Chronicle was closed in 1154, Norman chroniclers took up the tale in Latin.

See B. Thorpe's six-text edition, with translation, in the Rolls Series (1861); John Earle, *Two Saxon Chronicles* (*A and E*) *Parallel* (1865); Charles Plummer, *Two of the Saxon Chronicles Parallel* (1889, 1899). The translation by Giles (1847), often reprinted, is not so good as that of Stevenson (1853).

Angola is a name formerly used loosely of the whole West African coast from Cape Lopez to Benguela, but now at most of Portuguese West Africa from the Congo to South-west Africa, and bounded E. by Belgian Congo and Rhodesia. The area is stated at 484,000 sq. m., and the pop. at 4,120,000. The coast strip is level, barren, extremely hot, and very unhealthy. Beyond is hill country, reaching a height of 3000 feet, which promises to become an important source of maize, wheat, and beef. The main rivers are the Kwango, running north to the Congo, and the Coanza and Cunene, running west to the Atlantic. Railways run inland from Lobito Bay and Benguela and from St Paul. There is some export of wax, buffalo-hides, ivory, copal gum, and palm-oil. The natives are Congo negroes, and belong to the great Bantu stock. Diego Cam discovered this coast in 1486, but the capital, St Paul de Loanda, was not built till 1578. The finances, in spite of very heavy taxes, are most unprosperous. The recruitment of labourers, male and female, for the cocoa islands of St Thomas and Principe was even in the 20th century hardly, if at all, distinguishable from slave-raiding.

Ang'ora (anc. *Ancyra*), capital of Turkey, and of a province in Asia Minor, 230 miles ESE. of Constantinople (302 by rail, 1897), was the capital of the Roman province of Galatia Prima, and the scene of two Christian councils (314 and 358). Ancient remains are still to be seen. The *Marmor Ancyranum* furnished materials for the history of Augustus. The present city has 75,000 inhabitants, and is connected by a branch railway with the system which joins the Sea of Marmora with the Shatt-el-Arab at Basra. At

Angora Goats.

Angora, Mustapha Kemal Pasha after the Great War set up a 'national government' in defiance of Constantinople and the allied powers. It is famous for its breed of goats, with beautiful silky hair eight inches long. There are two or three varieties of the breed. The animal's coat is composed of two sorts of material—one hairy, short, and close to the skin; the other longer and woolly, farther from the skin. The latter is the most plentiful and most valuable. Of this goat's hair, often called *camel's wool, camlets* are extensively manufactured here. Many of the animals in this region are characterised by the length and softness of their hair, especially the dogs, rabbits, and cats; but this peculiarity disappears in Europe. The Angora goat is bred for its hair, called Mohair (q.v.), in the United States and in the Cape Province, and has also been introduced into Victoria.

Angostura, the capital of Bolivar state, Venezuela, on the right bank of the Orinoco, about 240 miles from its mouth. It is built at a pass (*angostura*), where the river is narrowed by rocks. The site is only 191 feet above the sea-level; and the Orinoco is navigable to this point for vessels of 300 tons. The town, which dates

from 1764, is the seat of a bishop. It exports balata, chicle, rubber, heron-plumes, gold, tonka beans, hides, cattle. In 1819 it was decreed that its name should be changed to Ciudad Bolívar, after the liberator. Pop. 20,000.

Angostura Bark, or CUSPARIA BARK, is the aromatic bitter bark of the *Galipea cusparia*, a native of Venezuela and other tropical countries. It derives its name from the town of Angostura, where it is a considerable article of commerce. It was first brought to England in 1788, although it had been in use in Spain since the year 1759. The *Galipea cusparia* is a small tree belonging to the natural order Rutaceæ, 12 to 15 feet high, with a trunk 3 to 5 inches in diameter. It flourishes at an elevation of 600 to 1000 feet above the sea, and its elegant white blossoms, which appear in great profusion in August, add greatly to the beauty of the scenery.

Angostura Bark is a valuable tonic in dysentery, chronic diarrhœa, and dyspepsia, but it is falling into disuse. It owes its virtues to a volatile oil, and a bitter principle, the nature of which is uncertain, to which the name Cusparia has been given. Under the name of Angostura Bitters, an essence containing angostura, canella, cinchona, lemon peel, and other aromatics, came into extensive use as a tonic; but much of what is sold is devoid of angostura, and consists mainly of cheretta or other simple tonic. Angostura contains an alkaloid called Angosturia. In the year 1804, a quantity of bark of a highly poisonous nature reached Europe, and being mistaken for Angostura Bark, gave rise to several accidents, and in consequence the use of Angostura Bark was prohibited in some countries. This spurious bark, now known as *False Angostura Bark*, is obtained from the Strychnos Nux Vomica, the source of strychnine, and it is readily distinguished from Angostura Bark by the following simple tests: It has no smell, has a resinous fracture, cannot be split up into small laminæ, has a pure bitter taste, without aromatic pungency, and when touched with nitric acid, develops on its inner surface a deep red spot, and on its outer an emerald green. Under this test the genuine bark becomes of a dull red colour on either surface.

Angoulême, the capital of the French department of Charente, and formerly of the province of Angoumois, stands 220 feet above the winding Charente, 83 miles NE. of Bordeaux by rail. Its old town has narrow crooked streets, and it contains a fine Romanesque cathedral (1136), and a striking hôtel-de-ville, with which is incorporated the remnant of the ancient castle of Angoulême, where was born the celebrated Marguerite of Navarre, author of the *Heptameron*. Ravaillac was also a native. The old bastions have been converted into fine terrace-walks. There are manufactures of machinery, paper, and wire, and a brisk trade in brandy. Pop. (1866) 24,961; (1921) 34,895. The province of Angoumois was in early times a county; but in the 14th century Philip the Fair took possession of it, and it became an appanage of the younger branches of the royal family. It was made a duchy by Francis I., and was sometimes bestowed upon natural sons of the French kings, such as Charles de Valois (1573–1650), son of Charles IX., a distinguished general in the reigns of Henry IV. and Louis XIII. It was given by Louis XIV. to the Duc de Berri, after whose death (1714) the title was attached to the princes of the elder Bourbon line.

Angoulême, LOUIS ANTOINE DE BOURBON, DUC D', the eldest son of Charles X. of France, and Dauphin during his father's reign, was born at Versailles on 6th August 1775. At the Revolution he retired from France along with his father, and after some years of military studies at Turin, and abortive military operations at the head of a body of French *emigrés* in 1792, he joined the other royal exiles, and lived with them at Holyrood, on the Continent, and latterly in England. In 1799 he married his cousin, Marie Thérèse, the only daughter of Louis XVI. and Marie Antoinette, a woman with something of the spirit of her mother, 'the only man in the family,' in the words of Napoleon. On the recall of his uncle, Louis XVIII., he was appointed lieutenant-general of the kingdom; and when Napoleon returned from Elba, he made a weak attempt to oppose him, but he was soon deserted by his troops, and obliged to surrender. After the second restoration he was charged with the suppression of the disorders in the southern provinces, and in 1823 he led the French army of invasion into Spain. On the revolution in July 1830, he signed, along with his father, an abdication in favour of his nephew, the Duc de Bordeaux; and when the Chambers declared the family of Charles X. to have forfeited the throne, he accompanied him into exile, to Holyrood, to Prague, and to Görz, where he died, 3rd June 1844. On the Duchess there are books by Lenotre (trans. 1908) and Turquan (trans. 1910).

Angoumois. See ANGOULÊME.

Angra, the capital of the Azores, a seaport at the head of a deep bay on the south coast of the island of Terceira. It is a station for ships between Portugal and Brazil and the East Indies; but the harbour is very much exposed. It is the seat of the bishop; is well built, but dirty; has fine churches, and is strongly fortified. Pop. 11,000, many of them Jews. There is a considerable export of wine, cheese, honey, and flax. Since 1834 it has added to its name the words 'do heroismo,' for the conduct of its citizens in the struggle against Don Miguel (1830–32).

Angra-Pequena, or LÜDERITZBUCHT, a bay in the southern part of the coast of Namaqualand (q.v.) in South-west Africa—mainly a sandy, waterless region, but rich apparently in metals, and enjoying a healthy climate. It was the nucleus of what grew to be the large area of German South-west Africa, of which it was the most important place and the only port. In 1883 it was ceded by a Namaqua chieftain to Lüderitz, a Bremen merchant; and next year it was taken under German protection, with all the coast to the north as far as Cape Frio, except Walvisch Bay, which belongs to the Cape Province.

Angri, a town of South Italy, 17 miles NW. of Salerno, with cotton and silk spinning, and 13,000 inhabitants.

Ångström, ANDERS JONAS, a Swedish natural philosopher, was born 13th August 1814, and in 1833 entered the university of Uppsala, where he became a *privat-docent* (1839), keeper of the observatory (1843), and professor of physics (1858). From 1867 till his death, 21st June 1874, he acted as secretary to the Royal Society of Sciences at Uppsala. His works embrace the subjects of heat, magnetism, and especially optics. His *Recherches sur le Spectre solaire* (1869) was an important supplement to Kirchhoff's work on the Solar Spectrum.—His son, KNUT J. ÅNGSTRÖM (1857–1910), was also an eminent physicist (in spectroscopy, solar radiation, and radio-activity), and professor at Uppsala.

Anguilla, or LITTLE SNAKE, one of the Leeward Islands, British West Indies, lying 160 miles E. of Porto Rico, and 60 miles NW. of St Kitts, of which presidency it forms part. Area, 35 sq. m.; pop. 4000. The island is long, winding, and very flat, and contains extensive pastures for cattle and

horses. Cotton, phosphate of lime, and salt are exported.

Anguilla. See EEL.

Anguis. See BLIND-WORM.

Angus. See FORFARSHIRE and DOUGLAS.

Anhalt, a state of the German republic, almost entirely surrounded by the Prussian province of Saxony, which breaks it up into two principal and five smaller portions. Area, 869 sq. m.; pop. (1875) 213,689; (1910) 331,128; (1919) 334,159, nearly all Protestants. Dessau, Bernburg, Köthen, Zerbst, and Rosslau are the principal towns. In the eastern part the country is level and fertile, producing wheat, flax, rape-seed, hops, and tobacco; but the western part, approaching the Harz Mountains, is hilly and largely covered with wood, and possesses mineral wealth, especially in lead and silver. Anhalt began to be an independent principality in the first half of the 13th century. It was repeatedly, in the course of its history, divided amongst branches of the reigning family. There were three duchies in the beginning of the 17th century, but the first line becoming extinct in 1847 and the second in 1863, the whole territory was reunited into one duchy, a republic since 1918.

Anhydrides is the term now commonly given to the compounds formerly known as anhydrous acids, which was a very unsatisfactory name, seeing that these bodies do not present any of the ordinary properties of acids. In some cases they are the result of the dehydration of acids, and in all cases they represent in their composition the acid *minus* water. Thus, in the following equation, we give an example of the formation of an anhydride:

Nitric Acid. Nitric Anhydride.

$$2HNO_3 - H_2O = N_2O_5.$$

The anhydrides of the monobasic acids are formed in various ways; thus, hypochlorous anhydride is formed by the action of chlorine on oxide of mercury; nitric anhydride is formed by the action of chlorine on nitrate of silver, &c. The anhydrides of tribasic acids are often formed by the mere action of heat on the acids, as is the case with lactic and tartaric acids.

The anhydrides present no uniformity of appearance; for example, carbonic anhydride (commonly known as carbonic acid, which in reality is CO_2H_2O) is a gas; phosphoric anhydride is a white powder; nitric anhydride occurs in crystals; sulphuric anhydride is a ductile wax-like substance; while the anhydrides of the organic acids are oily bodies heavier than water.

The most important property of this class is their conversion into the corresponding acids, under the influence of water.

Anhydrite, a mineral, consisting of anhydrous sulphate of lime, with some slight addition of sea-salt, appears in several varieties, as (1) granular, found in concretions with a foliated structure; (2) fibrous, easily broken with a fracture in delicate parallel fibres; (3) radiated, translucent; (4) sparry, or cube spar; (5) compact, of various shades, white, blue, gray, red. Anhydrite is converted into gypsum by combination with a certain proportion of water, and, where it is found in large masses, as on the south of the Harz Mountains near Osterode, the surface consists of gypsum. For building, anhydrite has no great value, on account of its tendency to this change; but some of its varieties, especially the Siliciferous or Vulpinite, found at Vulpino, in Upper Italy, are used for sculptures, and take a fine polish. When burned and reduced to powder, it is used as a manure, resembling gypsum in its effects.

Anhydrous is the term applied to a chemical substance free from water. Thus, ordinary lime-shell as it comes from the kiln is simply lime, CaO, without any water, and is called *anhydrous* lime; but when water is thrown upon the lime-shell, the liquid disappears by combination with the lime, which very much increases in volume and becomes *hydrated* lime, $CaOH_2O$. Again, ordinary stucco, before being used by the modeller, contains only lime and sulphuric acid, $CaSO_4$, with no water, and is therefore anhydrous; but when water is added, and the stucco sets into its mould, it combines with two equivalents of water, and becomes hydrated stucco, $CaSO_4,2H_2O$. Examples of anhydrous substances are also found amongst liquids; alcohol free from water is called anhydrous alcohol, and in like manner we speak of anhydrous acetic acid, anhydrous nitric acid, &c.

Ani, a ruined city of Turkish Armenia, about 25 miles SE. of Kars, splendidly situated on the apex of a plateau. In the 10th century it was the capital of the Bagratide kings of Armenia. Afterwards it was repeatedly taken and sacked, and in the 14th century it was finally overwhelmed by an earthquake. A few interesting churches, carved with Armenian inscriptions, are extant.

Aniline, or AMIDO-BENZENE, was discovered in 1826, as a product of the dry distillation of indigo; hence the name, derived from *anil*, the Portuguese for indigo. This source has now ceased to be of importance, for, practically, all the aniline now manufactured is obtained from coal-tar. When coal is heated in the manufacture of illuminating gas, a large number of substances are produced, and are obtained as a tarry matter of varying composition. Only a few of these bodies are of commercial importance, the chief being ammonia, carbolic acid, anthracene, naphthalene, pitch, and benzene. It is this last-named substance that yields aniline. If it is treated with strong nitric acid, an intermediate compound, nitro-benzene, $C_6H_5NO_2$, is formed, which, when mixed with acetic acid and iron-filings, yields acetate of aniline. Aniline may also be prepared by passing a mixture of benzene and ammonia through a red-hot tube, after the following reaction:

Benzene. Ammonia. Aniline.

$$C_6H_6 + NH_3 = C_6H_5NH_2 + H_2.$$

Aniline may be regarded either as benzene in which one atom of hydrogen has been replaced by the group amidogen, NH_2, or as ammonia, NH_3, in which one atom of hydrogen has been replaced by the radical phenyl, C_6H_5; and according as the one or other view is held, it is called amido-benzene or phenylamine (see ALKALOIDS).

The pure article is a colourless oily fluid, slightly soluble in water, but readily dissolving in alcohol and ether. It refracts light strongly, and possesses a weak aromatic taste. It boils at 360° F. (182° C.), and when pure, has a specific gravity of 1·020. It is a well-marked *Base* (q.v.), producing numerous crystalline salts, although it has no alkaline action on vegetable colours. It is a powerful narcotic poison, its fumes causing giddiness, and subsequently insensibility, while the body becomes of a livid leaden-blue colour. Taken internally, it soon causes death; and even when respired in small quantity, as by the workmen engaged in its manufacture, it causes severe headaches, nausea, and vomiting.

It is, however, as being the source of the numerous aniline dyes, that this body has become of leading importance.

Aniline unites with acids, forming salts, but these do not constitute the *aniline dyes*. These consist of various bases obtained by the oxidation of aniline by means of nitric acid, chlorine, arsenic, or other agents. In many instances these bases are quite colourless, and only develop their tints

when formed into salts. They may be regarded as Amines (q.v.)—i.e. ammonia in which hydrogen has been replaced by one or more radicals. Thus we have diphenylamine, $NH(C_6H_5)_2$; dimethyl aniline, $N(C_6H_5)(CH_3)_2$; methyl ethyl aniline, $N(C_6H_5)(CH_3)(C_2H_5)$; and so on. To refer at length to the various aniline dyes would be impossible, as these now number some hundreds, and we can only indicate the leading varieties. The colours produced by these dyes include every shade and tint, and the list of red or violet compounds would alone exhaust our available space. *Fuchsine*, which may be taken as typical of the red dyes, is formed when aniline is treated with strong nitric acid; but, in practice, many other chemicals may be substituted for the acid. *Blue dyes* are produced when aqueous aniline salts are treated with chlorate of potash and hydrochloric acid. *Mauveine*, a powerful violet dye, was discovered by Perkin in 1856, and this led the way in the manufacture of aniline colours. Perkin produced it by acting on aniline with bichromate of potash. We must pass over the various green, brown, yellow, and gray dyes, merely mentioning that the so-called aniline blacks are usually either very intense greens or blues, appearing black through concentration.

The aniline dyes are noted for their intense colouring power, one part of a rosaniline salt in a million parts of water still possessing a deep crimson colour, and instantly dyeing a skein of silk moistened with vinegar. Even in so dilute a solution as one grain dissolved in 1500 gallons of water, it is capable of dyeing a silk thread immersed in it for twenty-four hours.

Many of the dyes exhibit complementary colours (see LIGHT) when looked at by reflected and transmitted light; thus, the strong solution of the salt above referred to looks a purple red by transmitted, and a brilliant green by reflected light; a fact familiar to the users of an aniline red ink, or an ink for any of the familiar 'graph' copying processes. Here the pen assumes a green shining appearance, quite different from the colour of the ink. Aniline dyes are used as lacquers for cheap toys, being readily soluble in spirit varnish, the well-known 'bronzing liquid' being an example of this. Mixed with gelatin or collodion, and allowed to dry in thin sheets, they furnish the thin transparencies so much used for producing stained glass imitations. They have been also used for colouring wines and sweetmeats, but as arsenic was formerly or is still employed in the manufacture of the red varieties, this practice is not unattended with risk. The use of arsenic has of late been largely abandoned; or, when used, makers take care to eliminate the arsenic at the end of the process, so that the final product is innocuous. Numerous cases of skin-eruptions have been traced to the wearing of red flannel or red stockings dyed by aniline dyes. The readiness with which any housewife can dye articles of clothing or household ornaments has made them great favourites. The chief drawback lies in the fugitive nature of many varieties, but notwithstanding there is a wide field still open to them. The aniline colours are as a whole disapproved from the artistic point of view. Some of them are especially objectionable when used in the same textile fabric along with natural dyes. Notwithstanding this, the introduction of aniline dyes is said to have closed half the dyers' shops in India. A few years ago the Shah of Persia prohibited the importation of these colours into that country. Further details about aniline dyes are given under the article DYEING. Although England and France were first in the field, Germany took up the manufacture with so much zeal and scientific skill that it soon surpassed its competitors, producing superior shades of colour. Germany is now the headquarters of the industry, its products being of the highest class and the lowest price. The produce in Germany is estimated to be three times that of Britain.

See the obituary notice of Sir W. H. Perkin in *Nature*, 1907; Benedikt's *Chemistry of the Coal-tar Colours*; Hurst's *Dictionary of the Coal-tar Colours*; Nietzki's *Chemistry of the Organic Dyestuffs* (new ed. 1901); and books named at DYEING.

Animal. The popular classification of all bodies into three 'kingdoms'—the animal, the vegetable, and the mineral—only assumed authority in comparatively recent times, and has done much mischief in exaggerating the apparent differences between plants and animals on the one hand, and in obscuring the fundamental distinction between these and minerals on the other. There are in reality only two kingdoms of nature, the living and the non-living—the organic and the inorganic. The famous aphorism of Linnæus, 'Stones grow; plants grow and live; animals grow, live, and feel,' is no longer satisfactory, for growth is of two distinct kinds. While growth in minerals takes place merely by *accretion*—addition of new particles to the external surface, that of living matter is by *intussusception*—the interposition of new molecules between those formerly present. Again, living matter, or *protoplasm*, is clearly distinguished by its chemical composition, it being composed of very highly complex compounds, or mixture of compounds of carbon, nitrogen, hydrogen, oxygen, and sulphur, together with water and salts. During life, it is incessantly *disintegrating* and combining with the oxygen of the atmosphere, many products of change, chiefly carbonic acid, water, and nitrogenous waste being evolved; and *reintegration* must therefore take place by intussusception, for which purpose new matter containing the necessary elements must be taken up, either from other organisms or from the inorganic world. Certain *cyclical changes* are also exhibited by all forms of living matter—that is to say, each arises as a detached portion of some previous organism; develops into a form similar to that from which it arose; tends to reproduce itself; and, finally, ceases to live, when its protoplasm breaks up, and its elements ultimately return in a highly oxidised state to the inorganic world. Moreover, certain conditions of temperature, pressure, presence of oxygen, &c., variable only within comparatively slender limits, are essential to the maintenance of life.

While living bodies are thus clearly distinguishable from inorganic, every attempt to erect a similarly sharp distinction between plants and animals completely breaks down. Vast numbers of animals are destitute of the power of locomotion, so that, for instance, corals were unhesitatingly referred to the vegetable kingdom until about a century ago; while diatoms, and many embryonic algæ and fungi, which possess marked powers of locomotion, would thus require to be ranked as animals. Nor is sensibility a purely animal characteristic; the well-known sensitive plant, the sun-dew, and Venus's fly-trap, exhibiting it in the most marked degree. Cellulose, again, which forms the coating of the vegetable cell, was regarded as completely characteristic of this; but many algæ and fungi are naked at some period of their lives, while the thick external tunic of those degraded vertebrates known as Ascidians has essentially the chemical composition of plant cellulose. Chlorophyll, the green colouring matter of plants, is absent from fungi and from many flowering parasites, and is present in infusorians of animal mobility, if not even in higher forms, which thus vegetate in sunshine, forming starch and evolving oxygen. Some

insects, it is asserted, use the energy of sunlight for carbon-assimilation; while the well-known insectivorous plants (see DIONÆA, SUN-DEW) capture animals, and frequently digest them.

The attempt to establish a difference in structure is equally unsuccessful; for although the students of higher forms have no difficulty in grouping their flowers and ferns, their birds and beasts, into distinct series, the microscopist finds that these two great stems arise from a common root. It has therefore repeatedly been proposed to divide living forms into three groups—Animals, Plants, and *Protista*—a solution which, while decidedly gaining adoption on account of its great service in treating together the lowest forms hitherto separated as Protozoa and Protophytes, of course raises minor difficulties—that of distinguishing on the one hand between Protists and Animals, and on the other, between Protists and Plants. And thus every attempt to limit and define its forms has really resulted in proving the fundamental unity of life. The general study of the phenomena of life constitutes the science of Biology (q.v.), with its sub-sciences. For animal morphology, see ZOOLOGY, ANATOMY, VERTEBRATA, MAMMALS, BRAIN, FOOT, etc.; for animal physiology, PHYSIOLOGY, BIOLOGY, CELL, EMBRYOLOGY, CIRCULATION, DIGESTION, NUTRITION, REPRODUCTION. See also GEOGRAPHICAL DISTRIBUTION, EVOLUTION, etc.; for animal intelligence, see INSTINCT.

Animal Chemistry has for its subject the knowledge of the chemical phenomena of life in the animal body. In view of the essential similarity between the processes of life in the animal and in the vegetable kingdom, the distinction between the chemical processes in animals and in plants respectively is now no longer made, and the more general terms physiological chemistry or biochemistry are used to denote the science of the chemistry of life, which is the chemistry of protoplasm, the living substrate of the cell. Its object is to study the composition and properties of protoplasm and its various modifications, which form the tissues and organs of living things; to ascertain the precise nature of the constructive and destructive changes which take place in the living cell, or in the various tissues and organs, or in the organism as a whole; and to investigate the nature of the various agents by which these changes are effected. The study of the various aspects of biochemistry requires methods differing so widely that biochemistry is divided into a number of branches, each of which has attained almost to the rank of a separate science.

The first step to an understanding of the chemistry of life is a knowledge of the chemical composition of protoplasm. This is obtained by the methods of organic and inorganic chemistry. Protoplasm consists mainly of water, amounting to about 75 per cent. of its weight. It contains a small amount of inorganic salts and a number of organic substances, which according to their chemical constitution fall into different groups—viz. proteins, carbohydrates, fats, and lipoids (i.e. ether soluble substances). There are also a number of organic substances representing products of functional activity of the protoplasm. In the nucleus, the governing centre of the cell, protein is combined with nucleic acid, a complex compound of phosphoric acid with a number of organic substances (purin bodies, sugars, &c.). The inorganic salts are present in protoplasm dissolved in water mainly in the form of true solutions. The phenomena of osmosis and diffusion, which such true solutions exhibit, are also exhibited by protoplasm, and play an important part in the chemistry of life. The other organic substances are present in protoplasm mostly in the form of apparent solutions. These solutions are in reality very fine suspensions, the particles of which are not visible even with the highest powers of the microscope. Their appearance can be demonstrated by the so-called ultramicroscope. Such apparent solutions are called colloidal solutions. The chemical and physical properties of colloidal solutions are quite different from those of true solutions. The study of the chemistry of colloids and of the processes of osmosis and diffusion in their relation to life forms an important branch of biochemistry.

The chemical structure of almost all the substances present in protoplasm is known in all the essential features. But this knowledge, although indispensable for the understanding of the study of metabolism, the sum total of all the chemical changes which take place in the cell, gives no clue to the mechanism by means of which protoplasm is able to effect these changes. Some of the chemical processes which take place in the body can be carried out also by the chemist in the laboratory. But in order to attain this the chemist requires strong agents, such as heat, high pressure, strong acids or alkalies. In the living cell these changes proceed at body-temperature without the aid of any of these agents. It was believed, therefore, that the living cell possessed a special 'vital force,' which was indissolubly bound up with the life and structure of the cell. The work of the twentieth century has forced biologists to give up this idea. By suitable means the life and structure of a cell can be completely destroyed, while the remaining mass is still capable of inducing the changes which characterised the activity of living cells. Further investigations have shown that these activities are due to the presence of enzymes or ferments. These substances act by facilitating or accelerating a reaction, which in their absence would not take place at all or only very slowly. A very small and indeed unweighable amount of a ferment is capable of inducing a chemical change in a large amount of the substrate on which it acts. No ferment has as yet been prepared in a pure state, and the chemical nature of ferments is not known. But in inorganic chemistry some substances, such as porous platinum or a colloidal gold solution, are known which have a similar effect. Such substances are called catalysts. Ferments are catalysts.

Living cells react in a remarkable manner to certain chemical stimuli. The introduction into the body of certain foreign matter, such as cells or tissue-fluids from another species of animal, of bacteria or the toxic products of bacteria, stimulates the cell to produce new substances capable of reacting with this foreign matter. Thus the introduction of bacteria leads to the formation of substances which kill the bacteria. The administration of toxic bacterial products—for instance, diphtheria toxin—calls forth the production of an antitoxin, which neutralises the toxin. In this way protoplasm protects itself, renders itself 'immune' against harmful chemical stimuli. This important branch of biochemistry is called immunochemistry.

See Hammarsten, *Text-book of Physiological Chemistry* (7th ed. 1910); Schäfer's, Starling's, or other modern text-book of physiology.

Animalcule, a term which, although etymologically applicable to any very small animal, is limited in ordinary language to those which are microscopical. Animalcules exist in prodigious numbers, their size being such that myriads of them find ample space for all the movements of an active life within a single drop of water. Sea-water often contains them in enormous numbers, and the luminosity of the sea is often due to this cause (*Noctiluca*). Although, contrary to a widely diffused belief, they occur only in very small number in drinkable waters, they abound wherever

water becomes stagnant, or contains decomposable organic matter. Thus rain-water allowed to stand long in an open cistern, or the water of a vase in which cut flowers are placed, soon becomes more or less turbid and offensive; and if a drop be placed on a slip of glass and examined, even with a pocket lens, a multitude of living beings can be seen moving rapidly in all directions, while minute specks are also to be seen in motion between these. On the application of higher microscopic power, new organisms come again into view, so that the variations of size between the invisible inhabitants of one drop are as great as those between whales and minnows. An immense variety of animalcules can very easily be studied by collecting impure water from a dozen different sources, and keeping it separate in open wide-mouthed bottles in a window, and observing from time to time; for not only do the contents of the different vessels differ from each other, but they also vary greatly with the season, so that an unending source of new surprises is thus open to the most inexperienced microscopist without leaving his room. Besides obtaining numerous varieties of microscopic algæ, diatoms, bacteria, &c. (see ALGÆ, DIATOMS, PROTOPHYTES), examples of all the leading forms of minute animal life are thus to be obtained; and these, at first supposed to belong to the same general type of structure, are now known to be extremely varied. The simplest form which the observer will meet is a naked lump of jelly-like protoplasm, constantly flowing into new shapes, the Amœba (q.v.); while other masses of jelly, the Foraminifera (q.v.), may be found possessed of coverings of sand, or even carbonate of lime, and only protruding their irregular processes (pseudopodia) through its openings. Others again, the sun-animalcules of fresh water, and the Radiolarians, which inhabit the sea, are usually possessed of a beautifully marked flinty skeleton. These groups are usually united under the head of Rhizopoda (q.v.). Another great series, in which the form of the body is usually definite, the pseudopodia being generally replaced by vibratile threads or cilia, are termed the Infusoria (q.v.). All these are the equivalents only of a single cell of higher animals, and are therefore grouped into the subkingdom Protozoa; but many animalcules are of far more complex organisation. Thus the wheel-animalcules (see ROTIFERA) are segmented, worm-like animals; and the larvæ of almost all marine and fresh-water invertebrates are at an early stage free-swimming and microscopic. From its extreme vagueness, therefore, the term animalcule is now disused by scientific writers.

Despite their apparent insignificance, certain animalcules, by virtue of their almost imperishable skeletons, are among the most important agencies which have built up the crust of the earth. The surface of the sea is largely inhabited by Radiolarians and Foraminifera, the former preponderating in cold, the latter in temperate and tropical waters. As they die, their skeletons sink to the bottom, and form mud or ooze, which through time and pressure becomes consolidated into rock. Many polishing stones, &c. are thus mainly composed of Radiolaria; while chalk is principally formed by the skeletons of Foraminifera, and greensand of internal siliceous casts of these. Many limestones, marbles, quartzites, &c. are probably of similar origin, although all trace of organic structure may have been eliminated by metamorphic change. See PROTOZOA, PROTOPHYTES, and other articles named above; also any adequate work on microscopy—Carpenter's (8th ed. 1901), or Spitta's (1907).

Animal Heat. Living protoplasm is constantly in process of disintegration and oxidation, and these changes are accompanied by evolution of heat. The greater the activity of change, the higher does the temperature tend to become. Not only, therefore, are the so-called cold-blooded animals really warmer than the surrounding atmosphere, but even plants recognisably evolve heat, and the temperature of certain flowers, where protoplasmic activity is highest, may sometimes almost reach that of the human body. See ARUM.

Even the infusoria evolve heat, as is shown by the slowness with which the surrounding water freezes. John Hunter showed that worms and leeches, slugs and snails, were all one or two degrees warmer than the air. Fishes generally are only two or three degrees warmer than the water they inhabit; but in some of the more active, like the bonito and tunny, a temperature of 99° F. has been observed, while the surrounding water was at 80½°. So, too, the frog, which usually averages about 1° warmer than the air, is 2° or 3° warmer while breeding; while in certain lizards and snakes, a difference of as much as 15° to 20° F. has been recorded. Newport's researches on insects show that while the temperature of the larva may vary from ½° to 4° above that of the atmosphere, that of the pupa is almost imperceptibly higher, and that of the perfect insect may rise enormously; a difference of from 2° or 3° at rest, to from 9° to 20° in excitement, having been observed in individual bees, and a much more marked elevation in the temperature of the whole hive, which has been observed to reach 102° F. Among the animals commonly termed warm-blooded, the temperature, although generally higher in birds than in mammals, varies from species to species, yet is very nearly constant during health in each. Thus, while the average temperature of the human body is about 98·4° F., that of the wolf is 3° or 4° lower, and that of the arctic fox 5° or 6° higher. In birds, the temperature varies from 100° in the gull and other aquatic birds, to nearly 112° in the swallow, while, on the other hand, a hybernating mammal like the lemming becomes temporarily cold-blooded, its temperature during the winter sleep being comparatively little above that of the atmosphere.

From the preceding details, it will be seen that while cold-blooded and warm-blooded animals thoroughly agree in evolving considerable amounts of heat, the difference between them lies in this, that in the former the means of loss of heat by the skin, &c. are great as compared with the normal production of heat, while in the latter the loss and production of heat are kept balanced.

Physiologically considered, the animal body is a machine for converting the potential energy supplied by food into the actual energy of heat and mechanical work. What Aristotle simply referred to the heart, and mechanical physiologists to the friction of the blood, and so on, is now simply regarded as one of the results of the disintegration of the complex protoplasm. Knowing the quantity and chemical composition of the food, it is easy to calculate the amount of energy furnished to the body. The average income of energy of the human body on normal diet is about 1,000,000 metre-kilogrammes, of which about 150,000 units can be expended in muscular work, the remaining 850,000 leaving the body in the form of heat. As to the channels by which heat leaves the body, Helmholtz has calculated that fully 2½ per cent. leaves the body with the fluid and solid egesta, about 5¼ per cent. is spent in warming the expired air, about 14⅔ in evaporating the water expired by the lungs, and the balance, about 77½ per cent., by the skin, in conduction, radiation, and evaporation.

These general considerations once grasped, the apparent anomalies and variations in the temperature of different animals present no difficulty.

While heat is given off by the oxidation of the living matter of all the tissues, the greater part is the result of the activity of the muscular and glandular systems, and especially of the former.

For the lower or cold-blooded animals, the varying temperature is simply and directly associated with the varying amount of protoplasmic waste, and this again with the varying activities of the organism. The case of higher or warm-blooded animals (mammals and birds) presents, however, greater difficulty, since here the temperature remains practically constant throughout life (neglecting slight diurnal and seasonal variations, or the more serious perturbations due to the excitation and depression of the vital processes in various diseases). Some regulative mechanism must here be present, operating on the one hand to insure the regular maintenance of a minimum temperature, on the other to check its undue rise in periods of exceptional activity. This problem has been the subject of much physiological research, and is not yet fully exhausted; its essential solution is, however, due to Claude Bernard, whose *Chaleur Animale* (1876) may be taken as a centre round which the literature of the subject arranges itself, and continues to develop.

The regulation of heat is on the one hand automatically effected by the variations in the quantity *lost* in warming the breathed air, in the flow of blood through the skin, and in perspiration. Thus if more air be passed in and out of the lungs in a given time, or if the vaso-motor nerves allow the skin blood-vessels to dilate and admit of a larger flow, or if perspiration increase, the body will become cooler, and *vice versâ*. But on the other hand there is every reason to believe, since the researches of Hoppe-Seyler, Liebermeister, and others, that the *production* of heat through the activity of muscles and other organs is controlled by means of a special heat-regulating and nervous mechanism. Eulenberg and Landors have demonstrated a certain area in the brain, which, when stimulated, affects the temperature of the body. See PHYSIOLOGY, TEMPERATURE OF THE BODY.

Animal Kingdom. See ANIMAL, ZOOLOGY.

Animal Magnetism, MESMERISM, or HYPNOTISM. From time immemorial, Egyptian conjurers and sorcerers have been accustomed to produce artificial somnambulism, usually by inducing their subject to gaze intently for a few minutes at certain symbolic signs marked on the centre of a white plate. The Yogins, Hindu ascetics, also practise similar arts; while the peculiar states of trance or ecstasy into which the Mount Athos monks and other religious fanatics were accustomed to throw themselves are of kindred nature. So, too, many allusions in the works of classical authors relate to phenomena more or less of this kind.

About the middle of the 17th century, while the phenomena of terrestrial magnetism were attracting considerable attention, one Valentine Greatrakes, in London, professed to cure diseases by stroking with the hand. A century later, Gassner, a Swabian priest, employed a similar mode of treating disease, which he ascribed to demoniacal possession. About 1774, Mesmer, a Viennese physician, commenced to treat diseased organs by the application of artificial magnets. The phenomena exhibited by his patients, especially the more nervous of them, led him to adopt the view that the magnets operated not as special sources of influence, but as conductors of a magnetic fluid which he could communicate at will to the patient, even at a distance. Four years later, he commenced practice in Paris, with great success. His usual methods were to seat his patient with his back to the north, to press the pit of the stomach, and make passes with his hands in front of his face, meanwhile fixing his patient's eye, and soothing him by the aid of music. Sometimes too he placed his patients in connection with 'magnetised' trees, or set them in a circle around a covered vessel from which he professed to conduct the invisible fluid, thus inducing peculiar nervous conditions. In 1785 a royal commission was appointed to examine Mesmer's pretensions. These investigators found that the same phenomena could be produced in Mesmer's more nervous patients when blindfolded, by merely inducing them to suppose themselves in the neighbourhood of any of Mesmer's magnetic appliances, though none were really present; while conversely, magnets and magnetic trees were alike powerless, if the patient were kept unaware of their proximity. The Marquis de Puységur at the same time discovered that he could induce artificial somnambulism without the aid of magnets, by passes alone; but unfortunately for further investigation, the subject fell into the hands of the arch-quack, Cagliostro (q.v.), and thus became extremely discredited by physiologists. Despite the unfavourable report of the French commission of 1785, as well as of a later one in 1831, and other subsequent exposures, vague theories of magnetic influence, odylic force, new imponderable substance, electrobiology, or the like, kept constantly recurring, since science had nothing with which to replace them, until the investigations of James Braid, a Scottish surgeon settled in Manchester. In 1841 he went to a mesmeric séance, which seemed to him a mere triumph of imposture over credulity; but returning on another occasion to watch the details more narrowly, he was struck to find that the patient was really unable to keep his eyes open. After some reflection, he concluded that by continuous staring, the eyes with their nerve centres became fatigued, and the balance of the nervous system was thus destroyed. Resorting to experiment, he at once succeeded in throwing his servant and others into thorough mesmeric sleep by simply inducing them to gaze intently for a few minutes at the mouth of a bottle placed above, but close to, the eyes. He thus proved the absolute dependence of the mesmeric phenomena upon the physiological condition of the patient, not on that of the operator; and found that he had here to deal with a new order of cerebral states, henceforth to be classed with those of sleep, somnambulism, and insanity. He therefore proposed the word hypnotism, which now so advantageously replaces the terms animal magnetism and mesmerism. Braid continued his investigations for years, and attempted the treatment of certain diseases by inducing hypnotism. But the evil repute into which the subject had fallen prevented due appreciation of Braid's discoveries; not till after 1875 was hypnotism thoroughly investigated by physiologists, when Preyer and Heidenhain in Germany and Richet in France confirmed and extended Braid's results. No scientific observer has yet confirmed the statements of mesmerists as to clairvoyance, reading of sealed letters, influence on unconscious persons at a distance, or the like; and though the influence of the mesmeriser seems in many cases to be unimportant, 20th century experiments by Dr W. Kilner in London with dicyanin screens suggest that an actual current does pass from the operator to the subject, as shown by rays of light projecting from the finger-tips.

The physiological changes which are set up are usually as follows: A spasm of the accommodating apparatus first takes place, the pupils meanwhile dilating, and the eyeballs being protruded, while the eyelids droop. Respiration and

circulation become greatly accelerated, and perspiration frequently ensues. Finally, profound stupor may follow. A very remarkable degree of insensibility to pain exists, so that even surgical operations may sometimes be performed as well as under chloroform. The reflex irritability of all the voluntary muscles is greatly increased (indeed for days after the experiment), so that stroking an area of skin produces a spasm of the subjacent muscles, which may even spread over the whole body, producing a practically cataleptic rigidity, so that Heidenhain indeed considered the hypnotic state as nothing more than artificially produced catalepsy. These considerations indicate the danger of repeatedly subjecting the same person to hypnotic experiments, lest the abnormal state should be rendered permanent. Moreover, since in some persons the hypnotic state begins with general convulsions, the non-medical reader is warned against attempting to hypnotise.

During hypnotism, consciousness is diminished or dormant. The patient may, if only slightly affected, remember what has happened; if more fully hypnotised, he has no remembrance of his actions until hints are given; in the most complete state, he has no remembrance whatever. In hypnosis, however, sensory perceptions take place; but these are not converted into conscious ideas —in other words (as constantly happens in a 'brown study'), the sensation is present, but the power of directing the attention towards it is temporarily lost. Reflex action, however, goes on all the more freely in the absence of the inhibiting will; and thus movements made before a hypnotised person are perceived by the imperfectly closed eyes, and the stimulation of the organ of sense sets up a material change in the central nervous system, which liberates movements, apparently voluntary, yet not really so. Thus the patient may be induced to imitate every movement, however absurd or trivial, which is presented to him. The tendency to mimicry, so common especially in children, monkeys, parrots, &c., is thus intensified, or rather the stimulus of the sensory impression is allowed to work unchecked.

As sometimes in ordinary sleep, but here with ease and certainty, dreaming may be induced. Thus the medium may be conducted through all the stages of a journey, may be plunged into grief or raised to exuberant happiness by a few judicious suggestions. This state is nearly related to that of 'automatism at command,' where the medium obeys orders like a docile dog. Thus, as a crucial experiment, Heidenhain ordered his brother, a young medical student, to cut off his whiskers, the product of a year's assiduous cultivation, to the unbounded vexation of the unfortunate youth on awaking. So too, placing the body in a given position calls up the appropriate actions. A pillow, properly placed in the medium's arms, is nursed like a baby; music makes him dance; and so on. In all cases, the spoken command, the position of the limbs, or the sensory stimulus, sets up the impulse to the actions indicated, without either intelligence or volition being awakened.

The patient never falls down, and the power of co-ordinating the movements of walking, &c. is nearly perfect; his attitudes have often an unusual grace, and in the lighter stages of hypnotism he may converse freely and even with unwonted intelligence and emotion, due, doubtless, partly to freedom from the restraint of a knowledge of the surroundings, partly to the concentration upon a single train of thought. Very sensitive patients may be hypnotised by monotonous sounds like the ticking of a watch, or even by expectant attention, when alone.

Numerous other remarkable phenomena have been described. Thus, by gentle pressure on the neck of a patient, he can be induced to repeat words spoken in his presence, especially when the sounds are directed to a sensitive area just below the sternum. Automatism at command is greatly facilitated by imposition of the operator's hand on the patient's head. By passes on one side, catalepsy or paralysis of the opposite side only can sometimes be induced. Remarkable disturbances of the sensation of colour may take place. The state of the brain during hypnosis is not as yet well understood. The activity of the ganglion-cells of the cerebral cortex appears to be inhibited by the gentle prolonged stimulation. Additional light has been obtained by experiments upon animals.

Hypnotism came largely into use in medical practice in the last quarter of the 19th century, and its facts have important bearings on the phenomena of reverie, trance, somnambulism, religious excitement, mania, and spiritualism. There is reason to suspect also that the conventional surroundings and processes of education are not free from a pernicious tendency to produce and operate on essentially sub-hypnotic states of the pupils. Considerable light has been thrown by hypnotism upon the normal processes of cerebration, and on the action and mode of correlation of the senses.

See Braid's *Magic, Animal Magnetism, &c.* (3rd ed. 1852); Heidenhain's *Animal Magnetism* (1880); Binet and Féré, *Animal Magnetism* (1886); and for modern medical applications, the article HYPNOTISM and works by Bramwell (1903), Ash (1901), and Moll (1909).

Animals, CRUELTY TO, was first dealt with by legislation in Britain, where also societies for its prevention were earliest established. But till the 19th century the laws looked mainly to the protection of property. The English Society for the Prevention of Cruelty to Animals was founded in 1824, the Scottish society in 1839. Bear-baiting and bull-baiting were put down by law in 1835. From 1845 onwards other statutes were passed from time to time with a view to secure more humane treatment of domestic animals, wild animals in captivity, &c. Most of the earlier acts are now repealed, and their provisions consolidated and amended in the Protection of Animals Acts, 1911 and 1912, which are applicable to England and Ireland. The word 'animal' in these acts includes any domestic or captive animal, whether quadruped or not, and any bird, fish, or reptile which is in confinement, or which is maimed, pinioned, or kept otherwise in captivity. The offences, which under the acts are punishable summarily by imprisonment for three months, or a fine not exceeding £25, or both, include cruelly beating, kicking, ill-treating, or over-riding an animal; causing unnecessary suffering in carrying or conveying an animal; baiting any animal or keeping premises for that purpose; administering poisonous or injurious drugs; or subjecting an animal to any operation performed without due care and humanity. These provisions do not apply to Vivisection (q.v.) as regulated by the Prevention of Cruelty to Animals Act, 1896; or to the destruction of animals for food, unless unnecessary suffering is inflicted. The court, if satisfied that it would be cruel to keep the animal alive, may order its destruction at the expense of the owner. Failure to feed imprisoned animals is an offence punishable summarily with a fine of £5. Regulations are enacted for the conduct of knackers' yards. The shooting of captive birds was prohibited by an act of 1921. By the Protection of Animals (Scotland) Act, 1912, the law of Scotland on this whole subject has been in effect assimilated to that of England and Ireland.

Animals, WORSHIP OF, according to most students of comparative religion, is a stage in the

religious evolution, characteristic of the less cultured races, which has sometimes held its place in the higher stages of civilisation. It originates in Animism (q.v.), or spirit-worship, which is a universal phenomenon of humanity. The savage recognises in the animal, power or courage beyond his own, as well as a soul similar to his own, which continues to exist after death, and is still powerful for good or evil. Naturally, he tries to conciliate the power for evil indwelling in the animal, and thus reaches the stage of full or direct worship, in which he recognises the animal as the incarnation of a divine soul. Or he may recognise it as something acted through by a deity, and in his worship he is thus reverencing only the representative or symbol of some unseen deity, who for some reason assumes the form of the animal as his symbol.

But a wider and deeper motive for such worship is his veneration for the animal as a totem or representative of a tribe-ancestor or protector. Among primitive peoples, all animals are supposed to be endowed with souls, which in many cases have formerly animated human beings. Hence a likeness is often recognised between an animal and some deceased friend, and the animal is addressed as the person would have been, and honoured with a kind of worship. The case of an ancestral soul, worshipped as incarnate in an animal body, thus forms a link between manes-worship and beast-worship; and we find this connection otherwise in the veneration of a particular species of animal by a particular family, clan, or tribe. Many tribes call themselves by the name of some animal, and even derive their pedigree from it. Its cries become the omens of the tribe, and here we may find a key to an explanation of the divination and augury of more civilised nations. This curious and widespread belief in a descent from animals in connection with a belief in transmigration into other forms, goes far to explain such phenomena as lycanthropy (see WER-WOLF) and the unions between animals and human beings so common in folk-lore, and has doubtless originated in Totemism (q.v.). The division of a tribe into the families of the bear, crane, turtle, &c. indicates a time when families claiming descent from ancestors holding those names have banded themselves together for the common interest; and that an ancestor should be called the bear, or turtle, or crane, indicates a time still further back, when the name was given him for some reason. Many ethnologists, notably Herbert Spencer, suppose these names to have been originally personal epithets, designating qualities or characteristics of the individual (thus, a slow man would be called a turtle, a very long-legged man a crane), which became family surnames, and eventually gave rise to myths of the families being actually descended from the animals in question as ancestors; while popular mystification between the great ancestor and the creature whose name he held and handed down to his race, led to veneration for the creature itself, and thence to full animal-worship. The name was originally a mere nickname, but in process of time the meaning of the metaphor was lost, and the belief originated and was transmitted to posterity that the animal was the actual progenitor. Though such nicknaming as this has occurred, totemism must have had a much broader and deeper foundation. The mere fear of ancestral ghosts is too narrow a basis on which to build, as Spencer did, the whole structure of myth and religion, and does not allow sufficient play for the creative force of man's imagination as applied to the wondrous universe around him. Perhaps the worship of personal deities, seen in its greatest development in the North American native races, will lead us to a more satisfactory explanation of the origin of totemism as the basis of animal-worship. The *manitou* of the Indian is almost always an animal, and is chosen by each individual at his coming of age, being pointed out to him in a dream, produced by the greatest religious act of his life—his first fast. This animal then becomes an object of worship, and its skin is carried about the person as a fetish, and its likeness painted on the body or sculptured on the weapons. Thus tattooing and primitive heraldry may be explained as forms of worship, and here also we see the reason for the superstitious fear the savage entertains of killing or eating his manitou, or patron-animal. The manitou develops into the totem, or sacred animal, of the gens or family which descends from that person, and worship is paid to all representatives of its species. Equally strong evidence is obtained from the ancient nations. Some facts are preserved in the signs of the zodiac, the majority of which are animals, or compounds of human and animal forms. There is nothing in the grouping of the stars to suggest animal forms, and the probability is, that in ancient as in modern times, stars, when named, were given names of distinction that commanded respect, if not veneration; therefore that the animals whose names were transferred to the stars were, on earth, highly, if not religiously venerated. This is borne out by the legends of the transference to the heavens of particular animals. The frequency, also, of animal-names, and of representations of the same animals upon coins, points to the same conclusion. In the old Egyptian animal-worship, also, the theory of tribe-fetishes and deified totems is borne out. We find deities patronising special sacred animals, incarnate in their bodies or represented in their figures; while many of the sacred creatures are worshipped in one locality, yet killed and eaten with impunity elsewhere.

In the modern world, the most civilised people among whom animal-worship vigorously survives lie within the range of Brahmanism. Here, says Tylor, the sacred cow is not merely to be spared; she is, as a deity, worshipped and bowed to daily by the pious Hindu, who offers her fresh grass and flowers. Siva is incarnate in Hanuman, the monkey-god, as Durga is in the jackal; the wise Ganesa wears the elephant's head; the divine king of birds, Garuda, is Vishnu's vehicle; and the forms of fish, and boar, and tortoise are assumed in the avatar-legends of Vishnu, which are at the intellectual level of those Red Indian myths which they so curiously resemble. Perhaps no worship has prevailed more widely than that of the serpent. It had its place in Egypt and among the Hebrews; in Greece and Rome; among the Celts and Scandinavians in Europe; in Persia and India; in China and Tibet; in Mexico and Peru; in Africa, where it long flourished as the state religion in Dahomey; in Java and Ceylon; among the Fijians, and elsewhere in Oceania. And even within the limits of Christianity, we find the sect of the Ophites, who continued or renewed snake-worship, blended curiously with purer rites. It is evident, however, that although some animals may have received a preference, yet all had a share in the superstitious reverence of primitive peoples; and this broad universality of their worship militates against any other theory of its origin except that based on a belief in the free transmigration of souls from men to animals, and from animals to men, inherited from an early totem stage of society.

See Fergusson's *Tree and Serpent Worship* (1868); M'Lennan in the *Fortnightly Review* for 1869 and 1870; Herbert Spencer in the *Fortnightly* for 1870; chap. xv. of Tylor's *Primitive Culture* (1871); Gubernatis' *Zoological Mythology* (1874), for its facts; Robertson Smith in the *Journal of Philology* (1880); chap. vi. of Dorman's *Origin of Primitive Superstitions* (Philadelphia, 1881); Lang's *Custom and Myth* (1884), *Myth, Ritual, and Religion* (1887), and *Magic and Religion* (1901).

An'ima Mundi, according to many of the early philosophers, a force or vital principle immaterial, yet not intelligential; inseparable from matter, but giving it its form and movement, the source of all physical and sentient life. Plato held it impossible for pure spirit—the atmosphere in which alone eternal and archetypal ideas could exist—to bear any relation whatever to matter, and he therefore supposed the latter to be operated upon by an intermediate agency, the anima mundi. In the system of the Stoics, it was conceived to be the sole vital force in the universe; it usurped the office of pure spirit, and the doctrine became indistinguishable from Pantheism (q.v.). The notion does not seem to have been entertained by the schoolmen, but it reappears in the writings of Cornelius Agrippa, Paracelsus, and Van Helmont, and, in a modified form, was held by More and Cudworth. The latter recognised in 'plastic nature' the universal agent of physical phenomena. Amos Comenius found argument from Gen. i. 2 to prove that the spirit that 'moved on the face of the waters' still gives life to all nature. The doctrine of the immaterial *anima*, in matter, but distinct from it, was upheld by Stahl in 1720; but his term *animism* has now been adopted with a much wider signification by Sir E. B. Tylor and other anthropologists. See ANIMISM.

An'imé, a resin exuding from the trunk of the *Hymenæa Courbaril*, a large tree of the Leguminosæ, sub-family Cæsalpinioideæ, a native of tropical America. It somewhat resembles copal, to which in France the name *résine animé* is applied, but is more easily soluble in alcohol. Like the New Zealand dammar it is often found in lumps underground.—The name anime, or gum anime, is, however, also given in Britain to a resin called in India copal, the produce of *Vateria indica* (Dipterocarpaceæ); whilst the copal of Brazil, and apparently of Mexico, is (wholly or partly) produced by several species of Hymenæa. See also COPAL.

Animism, a term originally used to denote the theory of Stahl (q.v.), which regarded the vital principle and the soul as identical, but now used in the sense given to it by Sir E. B. Tylor as the general doctrine of spiritual being. Sir E. B. Tylor took the belief in spiritual existence as a minimum definition of religion. It appears among all low tribes with which we have any intimate acquaintance; and all travellers who have hitherto asserted the existence of races without it have been afterwards refuted by the facts. It may be considered to have arisen simply from the evidence of the senses, interpreted by the crude and childlike science of the savage. Two problems seem to have exercised the primitive mind. First, What is it which makes the difference between a living body and a dead one? what causes waking, sleep, trance, disease, and death? In the second place, What are those human shapes which appear in dreams and visions? The savage makes these two groups of phenomena each help to account for the other, by combining both in the conception of an apparitional or ghost soul, which is conceived of as an insubstantial human image, resembling a vapour or a shadow, the cause of life and thought in the individual it animates, capable of leaving the body and appearing to men waking or asleep as a phantasm separate from the body of which it bears the likeness, and able to enter into, possess, and act in the bodies of other men, of animals, and even of things inanimate. When the sleeper awakens from a dream, he believes that his soul has really been away, or that the souls of others have come to him. His body has been still, but his living self or soul, his phantom or image, has been active. And have not waking men, in broad daylight, sometimes seen these human phantoms in what are called visions or hallucinations; and after a man has died and been buried, has not his phantom-figure continued to appear to the survivors in dreams and visions? And what is his reflection seen in still water, or his shadow falling behind him, or the breath seen for a moment issuing from his lips like a faint cloud, but the man's ghost-soul becoming visible for a moment and vanishing again? In the thought of the savage, as of the child, personality is ascribed not to men and beasts only, but also to things. His ghosts do not come to him naked, but dressed in the well-known clothing worn in life. This is the explanation of one of the most wide-spread rites of animistic religion—the offering of funeral sacrifices for the service of the dead. The phantasmal images of the objects offered pass into the possession of forms shadowy like themselves—the souls of the dead. These spiritual beings fill all nature, animate and inanimate, and their life is a continuation and not a new life in savage religion. They transmigrate into human beings, animals, plants, and lifeless things, and they can avenge their past and present wrongs by bringing disease upon the offender. The man keeps after death the temper he had in life, and is powerful for good or evil according to his inclinations while alive. From this, and not from mere family affection, arises naturally the ancestor-worship which has been from remote antiquity, and is still, the main faith of the larger half of mankind. Above the commonalty of such spirits the primitive mind recognises higher spirits, or gods. Sometimes, by an extension of the natural order of life, the souls of great chiefs and warriors continue the same superior rank into the unseen world, and rise to divine honours. Was there a Pre-Animistic period? Some students hold that there was, and that then the causes of events were ascribed not to spirits, but to an impersonal power (*mana, orenda, wakonda*). Impersonal power, however, is an idea too abstract to have been reached by primitive man. In the most rudimentary stages of religion, ethical conceptions are but feebly developed, and there is little trace of moral retribution after death. The gods require their worshipper to perform his duty towards them, but do not necessarily concern themselves with his doing his duty to his neighbour. Yet the practical effect of religion on men's lives early begins to show itself. The worship of the dead naturally encourages good morals, for the ancestor who, while alive, saw that the members of his family did right by one another, and whose condition in the spirit-world is a continuation of his earthly character and rank, will naturally insist on this being continued when he is a divine ghost, powerful to favour or to punish. The world thus becomes regarded as the battle-ground of good and evil spirits, and from this follows naturally the idea of a dualism, or perpetual contest between good and evil, ranged under a supreme good and a supreme evil deity, which attains so great development in the ancient religion of Persia.

Animism, then, appears to the savage, on the evidence of his senses, to be a rational and fairly consistent philosophy, and it has maintained its place in higher civilisations. It is taught by Lucretius, when he makes his theory of film-like images of things (*simulacra* and *membranæ*) account both for the apparitions which occur to men in dreams and the images which impress their minds in thinking; and when Democritus explained the facts of perception, by declaring that things are always throwing off images of themselves (*eidōla*), which enter the recipient soul, he was simply answering the fundamental question of metaphysics, by turning to a new purpose, as a method of explaining the phenomena of thought, the savage doctrine of object-

souls. Animism is not a degeneracy from a higher culture. In it we find no survivals which show inconsistencies with itself; whereas, in all higher cultures, there occur survivals of primitive superstition, wholly inconsistent with the more advanced beliefs. Most primitive superstitions are found surviving, in modified form, in poetry and folk-lore, and often in common words and phrases, which have a meaning deeper than metaphor. Animism is not itself a religion, but a sort of primitive philosophy, which not only controls religion, but the whole life of the natural man. It represents a stage in the religious evolution which is still represented by the so-called Nature-religions, or rather by the polydæmonistic magic tribal religions.

See Tylor's *Primitive Culture* (4th ed. 1903); Rushton M. Dorman's *Origin of Primitive Superstitions* (1881); books by Miss Kingsley (1897–99) and Lang (1887–1901); Frazer's *Golden Bough;* also APPARITIONS, DEMONOLOGY, DREAMS, HALLUCINATIONS, RELIGION.

Anio, the ancient name of the Teverone, a tributary of the Tiber, which joins the larger river 3 miles above Rome. Its beautiful cascade at Tivoli (the ancient *Tibur*) is celebrated by the classical poets. The purity of its water was celebrated, and from it Rome was from 270 B.C. supplied with water by means of two aqueducts.

Anion. See IONS, ELECTRICITY.

An'ise (*Pimpinella Anisum*), an annual plant of the family Umbelliferæ. Two species are natives of Britain; they are commonly known by the name of Burnet Saxifrage, and have no properties of importance. Anise proper is a native of Egypt. It is cultivated in Egypt, Syria, Malta, and Spain, and even in Germany, especially in the district around Erfurt, where a large quantity of the seed is annually produced. Attempts were made, more than 200 years ago, to cultivate it in England; but the summers are seldom warm enough to bring it to perfection. It is occasionally sown in gardens for a garnish or for seasoning. Anise-seed (*aniseed*) is used as a condiment and in the preparation of liqueurs; also in medicine as a stimulant stomachic, to relieve flatulence, &c., particularly in infants. It has an aromatic, agreeable smell, and a warm, sweetish taste. Its properties are due to a nearly colourless or sometimes blue volatile oil, called *Oil of Anise*. *Anise-water*—water flavoured with the oil, and sugared—is much used in Italy as a cooling drink. The plant called anise in the New Testament is supposed to be *Peucedanum* (or *Anethum*) *graveolens* (see DILL).

STAR ANISE, or CHINESE ANISE, is the fruit of *Illicium verum*, a small evergreen tree of the family Magnoliaceæ, somewhat resembling a laurel. It receives its name from the star-like form of the fruit, which consists of a number (6 to 12) of hard, woody, one-seeded carpels. It is held in high estimation by the Japanese, and planted near temples. The whole plant is carminative, and is used by the Chinese as a stomachic and as a spice in their cookery. The qualities of the fruit, seed, and oil closely resemble those of the common anise, and the oil is imported for the same purpose. Star aniseed is also imported, chiefly from China and Singapore.

Anjou, a former province in the NW. of France, of about 3500 sq. m. in extent, now forming the department of Maine-et-Loire, and small parts of the departments of Indre-et-Loire, Mayenne, and Sarthe. It lies on both sides of the lower course of the Loire, where it receives the Maine. Its capital was Angers (Lat. *Andegavum*). The ancient inhabitants of Anjou were the *Andegavi*, who long and resolutely resisted the Roman arms. The first Count of Anjou was Fulk the Red, who was made count for his services against the Northmen in the 9th century. The male line of the ancient Counts of Anjou having become extinct in 1060, their title and possessions passed by the female line to the powerful House of Gatinais; and from one of this family, Geoffrey V., Count of Anjou, sprang the Angevin house of English kings, usually called Plantagenets, the last of whom was Richard II. Geoffrey conquered the greater part of Normandy, assumed the title of duke, and in 1127 married Matilda, the daughter of Henry I. of England, and widow of the Emperor Henry V. Through her, his son inherited the English throne, which he ascended in 1154 as Henry II. Anjou now became one of the possessions of the kings of England; but in 1205 the French acquired it by fortune of war; and it was bestowed as a fief upon Philip, the son of Louis VIII., and afterwards upon his brother Charles, who became the founder of that house of Anjou which gave kings to Naples and Sicily. Charles II. of Naples gave Anjou to his daughter Margaret on her marriage with Charles of Valois, the son of Philip IV. Her son ascended the throne of France as Philip VI. in 1328. King John in 1360 made Anjou a duchy, and gave it to his son Louis, and on his succeeding to the crown of Naples, it remained a possession of the kings of Naples till the overthrow of that dynasty under René II., when Louis XI. permanently annexed it to the French crown (1484). Subsequently it gave merely an honorary title to princes of the royal family—as, for example, the grandson of Louis XIV., who became Philip V. of Spain. Anjou was united with England for a short time during the reigns of Henry V. and Henry VI.—the latter king ceding it finally in 1444.

Ankarström, JOHN JACOB, the assassin of Gustavus III. of Sweden, born in 1762. The son of an officer of rank, he came very early to court as a page, and next entered the royal body-guard, but retired as early as 1783, and settled in the country. Being opposed to the measures taken by the king for curtailing the power of the senate and of the nobles, he became involved in certain intrigues in the island of Gothland, and was tried for treason, but released for want of positive evidence. Soon after he formed a plot with a ring of discontented nobles to murder Gustavus, and the lot to commit the dastardly deed having fallen on Ankarström, the old life-guardsman wounded the king mortally with a pistol-bullet at a masked ball on the 15th March 1792. Ankarström was executed on the 27th April, after having been publicly flogged for three successive days.

Anker, a Dutch liquid measure, formerly often referred to in England, containing ten wine gallons.

Anklam, a town of Prussia, in the province of Pomerania, on the navigable Peene, 4 miles from its mouth in the Kleines Haff, and 41 miles SE. of Stralsund by rail. It has long been a place of commercial importance, having been a member of the Hanseatic League from the 14th to the 16th century. It has manufactures of iron, machinery, furniture, sugar, and leather, besides flour and saw mills. During the Middle Ages Anklam suffered sorely from fire and pestilence; and in the wars of the 17th and 18th centuries it was again and again besieged and sacked. In 1762 its fortifications were dismantled. The town contains many interesting specimens of Hanseatic architecture. Pop. (1925) 14,814.

Ankle. See FOOT, SPRAIN.

Anko'bar, old capital of the kingdom of Shoa (q.v.) in Abyssinia, is built 8200 feet above sea-level, and consists of 3000 huts scattered over a mountain. When the king was in residence the population increased from 6000 to near 15,000. It is at times practically a city of the dead.

Ankylo'sis (Gr. *ankylōsis*, 'bending' or 'crooking;' *ankylē*, 'stiff-joint') is a term used in surgery to imply a stiffness in any joint. It is usually the result of disease, which destroys either the articular cartilages, leaving two bony surfaces opposed to each other, to become united by subsequent formation of bony or fibrous tissue, or thickens and shortens the natural fibrous tissues around the joint. Severe injury may also lead to a similar result. If the bond of union be osseous, the joint is perfectly rigid; if fibrous, it may allow a certain amount of motion. Some joints, especially the elbow, are very apt to become ankylosed; and in the knee or hip-joints, osseous ankylosis, with the limb in a proper position, is frequently the most favourable termination to disease, as the limb can then afford a rigid support for the trunk. Joints, stiff through a fibrous ankylosis, may be forcibly bent, and the bond of union ruptured, so as to restore mobility, or allow of their being placed in a convenient position. In some joints, especially the elbow, ankylosis may be remedied by excision of the joint. Ankylosis of the joints between the vertebræ is common in advanced age; and in rheumatoid arthritis universal ankylosis of all the joints sometimes takes place.

Ankylostomiasis, a formidable and widespread parasitic disease in man, due to a small nematode in the duodenum and small intestine. It is perhaps the most important worm-parasite in man. The parasites burrow in the walls, destroy the capillaries, and produce pernicious anæmia—e.g. miner's anæmia. The fertilised eggs pass from the intestine, and develop in damp earth; the larvæ pass in by the mouth or bore their way rapidly through the skin. The European species, *Ankylostomum duodenale*, has been disseminated in America, Africa, and Asia; the Asiatic and African species, *Necator Americanus*, has now become common in America.

Ann, or ANNAT. See ANNATES.

Anna, or ANNE, ST, according to tradition, wife of St Joachim, and mother, after twenty years of barrenness, of the Virgin Mary, the mother of Jesus.—Ste Anne d'Auray, in Brittany, is a famous place of pilgrimage; and Ste Anne de Beaupré, near Quebec, is its counterpart in the New World.

Anna, an Indian coin, value nominally 1½d. sterling, but always the sixteenth part of a rupee.

Annaberg, a town of Saxony, on the northern slope of the Erzgebirge range, 34 miles S. of Chemnitz by rail. It is situated 1800 feet above sea-level, in what was once a mining district; the surrounding hills containing silver, tin, cobalt, and iron. It has extensive manufactures of lace, silk ribbons, corsets, and buttons. The ribbon manufacture was introduced here by Protestant refugees from Belgium in 1590. The mining industry was important in the 16th century, and still lingered in the 19th. Population 18,000.

Anna Carlovna, regent of Russia during the minority of her son Ivan, was the niece of the Empress Anna Ivanovna (q.v.), and in 1739 married Anton Ulrich, Duke of Brunswick-Wolfenbüttel. Her son Ivan, born in 1740, was nominated by the Empress Anna as her successor; and Anna Carlovna proclaimed herself regent, but showed no capacity. A conspiracy took place in 1741; the infant Ivan was murdered; and Anna and her husband were imprisoned at Cholmogory. Here she died in 1746; while Anton was confined till his death in 1776.

Anna Comne'na, a learned Byzantine princess, author of one of the most valuable of the Byzantine histories, was the daughter of the Emperor Alexius I. (Comnenus), and was born on December 1, 1083. She received the best education that Constantinople could give, and early displayed a fondness for literary pursuits; but was also habituated from her childhood to the intrigues of the court; and during the last illness of her father, she entered into a scheme, which her mother, the Empress Irene, also favoured, to induce him to disinherit his eldest surviving son, John, and to bestow the diadem on her. Failing in this, she framed a conspiracy against the life of her brother (1118); and when her husband, Nicephorus Bryennius, a Byzantine nobleman, either from timidity or virtuous principle, refused to join in it, she passionately lamented that she had not been born a man, and upbraided him for having the soul of a woman. Her brother spared her life, but confiscated her property, which, however, he soon after generously restored. Disappointed and ashamed, she withdrew from the court, and sought solace in literature. On the death of her husband (1137), she retired into a convent, where she died in 1148. Her life of her father, entitled *Annæ Comnenæ Alexiadis libri XIX.*, is full of professions of careful inquiry and a supreme regard for truth, the effect of which is weakened by 'the perpetual strain of panegyric and apology.' The style is characterised by an elaborate affectation of rhetoric. The best edition is that of Schopen and Reifferscheid (2 vols. 1839–78). See Oster's *Anna Comnena* (3 vols. 1868–71).

Anna Ivanovna, Empress of Russia, born in 1693, was the second daughter of Ivan, elder brother of Peter the Great. She married in 1710 the Duke of Courland, who died in the following year; and she obtained the duchy of Courland for her favourite, Biron (q.v.), a Courlander of low birth. The throne of Russia was offered to her by the Supreme Council on the death of Peter II. in 1730, on conditions which greatly limited the power of the monarchy, but which she soon broke. She declared herself autocrat, and suppressed an attempt of the nobles to establish a constitutional government; and her paramour, Biron, having determined to govern the nation as well as the empress, established a reign of terror through the land. He is said to have banished not less than 20,000 persons to Siberia; many were broken on the wheel. Prince Dolgoruki and others of the highest rank perished on the scaffold. Anna died in 1740, and left the throne to her grand-nephew, Ivan.

Annals. These were at first books which contained a record, in chronological order, of the principal events occurring in one or more years. The name is derived from the oldest historical documents of the Romans, the *Annales Pontificum*, or *Annales Maximi*, the duty of drawing up which devolved upon the *Pontifex Maximus;* but these were all destroyed by the Gauls at the sack of Rome, nearly four hundred years before the time of Christ. After the second Punic War, the *Annales Gentium* and *Annales Consulares*, of families or individual public men, continued to be composed by educated members of the Roman laity, such as Fabius Pictor and Calpurnius Piso. At a still later period, the term was applied to any historical work that followed the order of time in its narrations, separating them off into single years—as, for instance, the *Annals* of Tacitus.

Annam, a territory along the east coast of Indo-China, between 10° and 23° N. lat., forming an empire which, since 1885, has been under a French protectorate. The names Annam and Cochin-China are sometimes used as interchangeable; sometimes the whole region is Annam, with Tongking (Tonquin) and Cochin-China as subdivisions; and conversely, sometimes Cochin-China has Tongking and Annam for its northern and southern

sections. Cochin-China was the name originally given by the early navigators to the whole coast from Siam to China. Annam, a name given by the Chinese in the 3d century A.D., was adopted by the Annamese as the official name for the whole country.

The French usage is to treat French Indo-China (with Hanoi as administrative capital) as including Annam, Cambodia, Cochin-China, Laos, and Tongking (Tonkin), with a total area of about 300,000 sq. m., and a total population of 20,000,000. Of this total, Annam has perhaps—with recent additions—over 60,000 sq. m., its pop. in 1920 being about 5,700,000. Annam lies between Tongking on the N. and Cochin-China and Cambodia on the S. On the W. the mountain-range bounding the Mehkong valley on the E. was till lately regarded as its frontier towards Siam. But after a controversy with Siam, ending in a treaty (1893) enforced by a French warship at Bangkok, the Mehkong was made the frontier with Siam, from Cambodia to 18° N. Annam accordingly now includes a large number of the hill-tribes, Mois or Khas, and Laos. The country, save on the coast and along the Mehkong, is mountainous; minerals are believed to abound; coal is worked near Turane. The mountains are covered with valuable timber, and the lower lands are extremely fertile. The chief productions are, besides rice and other cereals, cotton, cinnamon, sugar, tea, coffee, and tobacco. The chief ports are Turane (wholly under French control), Qui-nhon, and Xuan-day: Hué is the capital. The principal imports are rice, cotton cloths and yarns, opium, and paper, for the most part from China and Japan.

The other sections of French Indo-China are treated in separate articles (see CAMBODIA, COCHIN-CHINA, TONGKING; see also the articles on BURMA and SIAM). But as Tongking has been so closely associated with Annam, its physical geography may be mainly dealt with here. Tongking, with an area of about 46,000 sq. m., and over 6,000,000 inhabitants (mainly Annamites, with some Mois), falls into three distinct natural divisions—(1) the delta-land in the SE.; (2) the region of plateaus in the north; and (3) the forest region in the west. The Song-coi, or Red River (called Thao by the Annamese, and Hong-kiang by the Chinese), flows across the whole of Tongking from NW. to SE. The delta-lands formed at its mouth may be defined as a rough insular triangle, the apex of which is Son-tay, and its two sides, Song-dai on the south, and Song-can on the north, both issuing into the sea. Not far below Son-tay the Song-coi opens out at intervals into four leading branches, of which one is navigable for large ships. These main water-ways are connected by a network of subsidiary channels—many natural, some in part artificial. The delta-lands are all crossed by great embankments or dykes, hundreds of miles in extent, often 60 to 70 feet wide at the base, 20 to 30 feet high, and broad enough at the top for three carriages to drive abreast. The delta-lands are extremely fertile, yielding two harvests a year. This fertility is due to the red soil which is transported by the Song-coi (Red River), and which is rapidly enlarging the delta. Hanoi, a seaport when built by the Chinese in the 8th century, is now 70 miles inland. Now, too, there are populous agricultural villages where a few years ago fishermen cast their nets. The staple product is rice; but there are also grown pea-nuts, castor-oil, mulberry for silkworms, cotton, sugar-cane, spices, sweet potatoes, &c. The north of Annam is rich in minerals of all kinds, and there have been opened gold, silver, copper, tin, and salt mines, while extensive coal-fields have hardly yet been touched. The mountains are covered with all kinds of useful woods.

Though Annam lies wholly in the torrid zone, yet the climate of Tongking is on the whole excellent. During the dry season, from September to April, the thermometer varies between 70° and 40° F. During the hot and rainy season, extending over the other six months, the thermometer seldom mounts from a minimum of 70° to beyond 100° F. On account of the moisture, however, the heats in June and July are sometimes almost intolerable. In the mountains of Annam, tigers, buffaloes, rhinoceroses, and elephants abound. Much fishing is carried on.

Inhabitants.—The Annamese are mainly of Mongoloid stock. The inhabitants of the mountains (Muong or wild people) are taller, fairer, and stronger than the inhabitants of the plain. The latter are small of stature, but well proportioned, indolent, but expert. Rice is their principal food; but, like the Chinese, they are omnivorous, and devour snakes, locusts, rats, and dogs. The Tongkingese display wonderful skill in building dykes. Yet at Haiphong, the Chinese have monopolised all the industries demanding skill and perseverance; and 'lazy as an Annamese' is a common proverb. The only good industries carried on in Annam are in lacquer and the finer metals. The manufacture of steel is unknown. Sericulture and silk-weaving are far behind the state attained by those arts in China. The dykes offer the most available roads, and the only two great highways are the route from Saigon through Hué to Hanoi, and by way of Bac-ninh and Lang-son to China; and the northern road from Hanoi to Son-tay and Hung-hoa. The speech of the Annamese is monosyllabic, like Chinese, from which they have borrowed many words. The Annamese written character was also derived at an early period from the Chinese alphabet. There is no Annamese literature distinct from the Chinese. The mass of the people worship tutelary spirits; Confucianism is in vogue with the more cultivated; the remainder adhere to Buddhism. There are besides about 420,000 Roman Catholics, descendants of emigrants from Macao and Japan (1624), and of Portuguese fugitives from Malacca.

Government.—The frame of government was of Chinese pattern, but in its operation was much harsher and ruder than its prototype. The emperor was absolute despot. Unless the actual monarch should have decreed otherwise, the succession passes to the eldest son. He is assisted by a council of ministers. Military service is obligatory on all men between the ages of 18 and 60; and they are so often called out that the field-work is left principally to women. The capital of the empire is Hué. The administration is now carried out by Annamese officials under French control. Since 1887 Annam has formed part of the Indo-Chinese Customs Union.

History.—Tongking and Cochin-China were, 214 B.C., conquered by China, and occupied by Chinese colonists. In 939 A.D. Tongking freed itself from the yoke of China, and in 1403 a war commenced, which in 1428 ended with Annam's independence of China, although the latter still maintained a nominal suzerainty. In 1517 the Portuguese came into the country, followed by the Dutch, who established a trading settlement in Hanoi. In 1789, by the aid of the French, the emperor of Annam united Tongking and Cochin-China under his rule. In 1858 a Franco-Spanish squadron stormed Touron, and next year Saigon likewise surrendered. In 1861 the whole province of Saigon submitted to France. Other provinces soon fell, and by the treaty of Saigon or Hué (1862) 'French Cochin-China' was established, and afterwards enlarged.

In 1870 Dupuis made a voyage up the Sang-coi as far as Yunnan; and in 1873, with 100 French soldiers, captured Hanoi. By commercial treaty (1874) with Annam, France secured the right of holding the delta-lands of Song-coi, and freeing them from pirates. Accordingly, in 1882, Major Rivière made himself master of Hanoi, and, notwithstanding the protests of China, Annam, by treaty on the 25th August 1884, acknowledged the suzerainty of France, and her right to regulate the relations of Annam with foreign powers, China included. After some conflicts with France, China also, by the treaty of Tien-Tsin, 9th June 1885, engaged to respect the new state of affairs introduced by France into Annam, and to sanction commercial relations between China and Tongking. Thus practically the whole of Annam, including Tongking and Cochin-China, has been made a dependency of France.

See French works on Annam and French Cochin-China by De Lanessan (1895), Barral, Barthèlemy, Dupuis, Legulière-Beauclerc, Neton, Jottrand, and Russier and Brenier; English by A. Cunningham (1902).

Annamaboe, a small seaport town, protected by a strong British fort, on the Gold Coast of Africa, 10 miles E. of Cape Coast Castle. It has a good landing-place, and is a free port, but there is little trade. Pop. 5000.

Annan, a small seaport, and royal and parliamentary burgh, in Dumfriesshire, on the river Annan, near its entrance into the Solway Firth, 18 miles ESE. of Dumfries by rail. It is neat and well built; among the chief industries are tanning and bacon-curing. Edward Irving was a native; and Carlyle, as a schoolboy, led 'a doleful and hateful life' at the academy. The burgh united (till 1918) with Dumfries, &c., in returning one member to parliament. Pop. 4000.

Annandale. See DUMFRIESSHIRE.

Annap'olis, a seaport of Nova Scotia, on an arm of the Bay of Fundy, 95 miles W. of Halifax by rail. Its harbour is large and sheltered, though somewhat difficult of entrance. Annapolis is the oldest European settlement to the north of the Gulf of Mexico, having been established, in 1604, by the French as the capital of their province of Acadia, under the name of Port Royal. Acadia was ceded to Britain by the French in 1713, when Port Royal changed its name in honour of Queen Anne, continuing to be the seat of government, till in 1750 it was superseded by the newly founded city of Halifax. A fire in 1921 destroyed about a third of the town, but the historic buildings were unhurt. Pop. 1000.

Annapolis, the capital of Maryland, U.S., stands on the south bank of the river Severn, 2 miles from its entrance into Chesapeake Bay, and 40 miles E. by N. of Washington by rail. It has an air of quiet seclusion, more like a European town than an American city. Among its edifices are an imposing state-house, St John's College (1789), a Roman Catholic seminary a naval hospital (1871), and a United States naval academy, established in 1845. Pupils remain in this institution for four years, previous to examination and admission into the navy as midshipmen. Founded as Providence in 1649, Annapolis received its present name in honour of Queen Anne. Pop. 11,000.

Ann Arbor, a flourishing city of Michigan, capital of the county Washtenaw, on the Huron River, 38 miles W. of Detroit by rail. It was settled in 1824, and incorporated as a city in 1851. The state university, founded 1837, possesses good libraries, a notable observatory, laboratories and museums, and is organised in seven departments. There are several faculties, and, as in Europe, examinations for degrees are conducted on work done out of class. The city has an active trade, and contains manufactories of carriages, furniture, paper, woollen goods, blinds, and ploughs. There are mineral springs and a hydropathic establishment. Pop. 20,000. A fourth of the inhabitants are of German descent.

An'nates, or FIRST-FRUITS, in the ecclesiastical law of England, meant the value of every spiritual living for a whole year, which the pope, claiming the disposition of every spiritual benefice within Christendom, reserved out of every living. This impost was at first only levied from persons appointed to bishoprics, but was afterwards extended to the inferior clergy. It was abolished in 1534, and in the following year the right to annates was annexed to the crown. The fund thus arising was administered for the benefit of the Church of England. It was transferred to the governors of Queen Anne's Bounty, and afterwards to the Ecclesiastical Commissioners. For the purposes to which it is now applied, see ECCLESIASTICAL COMMISSIONERS.

ANNAT, or ANN, in Scots law, signifies the half-year's stipend payable for the vacant half-year after the death of a clergyman, to which his family or nearest of kin had right, under an act of the Scottish parliament passed in the year 1672. It was a right that did not belong to the clergyman himself, but to his next of kin absolutely, and therefore could neither be assigned or disposed of by him nor attached for his debts. It was abolished in 1925.

Annatto, or ANATTA, also known as *Arnotto, Roucou,* and *Orleana,* is the reddish pulp surrounding the seeds of *Bixa Orellana* (Bixaceæ), a medium-sized tree growing in Guiana and other parts of South America. The fruit having been bruised and macerated with water, the juice is allowed to stand till the colouring matter subsides to the bottom (an operation hastened by the addition of vinegar), when it is strained and the residue dried. Sometimes fermentation is allowed to take place, when an article superior for dyeing purposes, but having a disagreeable odour, is produced. Annatto is used in the dyeing of cloth, to which it imparts a bright orange tint, of slight permanence, however; and it also enters into some bright-coloured varnishes. It is in the manufacture of butter and cheese that it finds its widest application, although its value in this respect is purely a sentimental one, depending on the taste for a high-coloured article. As met with in this country, it contains flour, chalk, and other foreign substances, which, however, can hardly be regarded as adulterants, being necessary to adapt the crude article to its various uses.

Anne, Queen of Great Britain and Ireland, and the last British sovereign of the House of Stuart, was born at St James's Palace, London, on 6th February 1665. She was the second daughter of James II. of England and VII. of Scotland (who at the time of her birth was Duke of York), by his first wife, Anne Hyde, the daughter of the famous Earl of Clarendon. When she was six years of age, her mother died; and her father soon after professed himself a member of the Church of Rome; but his daughters were educated in the principles of the Church of England, to which Anne always retained an ardent if not a very enlightened attachment. In 1683 Anne was married to Prince George of Denmark (1653–1708), an indolent and good-natured man, who concerned himself little about public affairs, and had as little capacity for dealing with them. Soon after her marriage, the wife of Colonel Churchill (afterwards the famous Duke of Marlborough) was appointed one of the ladies of her bed-chamber. As the queen

needed some one on whom she could lean, Lady Churchill speedily became her intimate friend, and acquired supreme influence over her, which she exerted in favour of her husband. In their correspondence with each other, Anne went by the name of Mrs Morley, and Lady Churchill by that of Mrs Freeman. During the reign of her father, Anne lived in retirement, taking no part in politics. On the landing of the Prince of Orange, she soon joined his party, the Churchills having decided on that step. She consented to the act by which the throne was secured to the Prince of Orange in the event of his surviving her sister Mary; but quarrelled with her sister about questions of etiquette, and was afterwards drawn into intrigues in which the Churchills were engaged, for the restoration of her father, or to secure the succession of the throne to his son. She even entered into a secret correspondence with her father. She was herself childless when, on the death of William III., on 8th March 1702, she succeeded to the throne. She had borne, indeed, seventeen children; but only one, the Duke of Gloucester, survived infancy, and he died in 1700, at the age of 11. The influence of Marlborough and his wife was most powerfully felt in all public affairs during the greater part of her reign. The strife of parties was extremely violent, and political complications were increased by the queen's anxiety to secure the succession for her brother. In so far as she had any political principles, they were opposed to that constitutional liberty to which she owed her occupancy of the throne. These principles and her family attachment tended to alienate her from the Marlboroughs, whose policy, from the time of her accession, had become adverse to Jacobitism, and who now, along with Godolphin, were at the head of the Whig party. The duchess also offended the queen by presuming too boldly and haughtily upon the power which she had so long possessed. In 1710 they parted, never to meet again. Anne found a new favourite in Mrs Masham, a cousin of the duchess, who herself had introduced her into the royal household. To Mrs Masham's influence the change of government in 1710 was in a great measure owing, when the Whigs were cast out, and the Tories came into office, Harley (afterwards Earl of Oxford) and St John (Lord Bolingbroke) becoming the leaders of the ministry. But, although concurring more or less in a design to secure the succession of the throne to her brother, the new ministers had quarrels among themselves which prevented its successful prosecution, and kept the poor queen in a state of constant unrest. She died 1st August 1714. The Elector of Hanover succeeded her as George I.—The public events of her reign belong to the history of Britain; but the union of England and Scotland, in 1707, may be mentioned in its personal relation to herself, as she was the last sovereign who reigned over these as separate kingdoms, and the first sovereign styled of Great Britain.—Queen Anne was virtuous, conscientious, and affectionate, more worthy of esteem as a woman than of admiration as a queen. Her reign was rendered illustrious by some of the greatest names, both in literature and science, which this country has ever produced.

See, besides the histories of England, books on her and her reign by J. H. Burton (1880), Justin McCarthy (1902), Herbert Paul (1906), and P. F. W. Ryan (1909).

Anne Boleyn. See BOLEYN.

Anne OF AUSTRIA, daughter of Philip III. of Spain, was born in 1601, and in 1615 became the wife of Louis XIII. of France. The marriage was so far from being a happy one, that the royal pair lived for twenty-three years in a state of virtual separation—a result due chiefly to the influence of Cardinal Richelieu, whose fixed determination to humble the House of Austria led him to spare no means for alienating the affection of Louis from his queen. On the death of the king in 1643, Anne became queen-regent, but disappointed the parliament and the nobility, who had hoped to secure again their ancient authority, by choosing as her minister Cardinal Mazarin, under whose strong and skilful management the young king (Louis XIV.) came, on attaining his majority, into possession of a throne firmly established on the ruins of contending parties. The character of Anne had much influence in moulding that of her son. She had, however, no capacity for actually managing affairs, and on the death of Mazarin retired to the convent of Val de Grâce, where she died in 1666.

Annealing. When a slab of glass or metal is allowed to cool down rapidly from its melted state, the constituent particles near the surface become differently arranged from those in the interior. The molecules next the skin are in a different state of tension from those inside. Annealing is a process of slow cooling of a body from a high temperature, by which there is secured a more or less uniform arrangement of the particles or molecules throughout its mass. Glass is in this way made strong and able to resist changes of temperature. The mere dropping of a small angular fragment of some hard substance, such as flint, into a glass vessel before it is annealed, usually makes it fly to pieces. A still more striking example of the unstable nature of unannealed glass is seen in Prince Rupert's drops. These are drops of glass which have fallen in a melted state into cold water, and have assumed a tadpole-like shape. If the point of the tail of one of these be nipped off with the fingers, the whole of it will fall into dust with a loud explosion. This shows that whenever the skin is broken, the particles beneath it are acted on by a repellent force, and fly away from one another.

An annealing kiln or oven is usually of some length, and the glass vessels or sheets placed in it are raised to near their melting-points at its hottest portion, and then moved away at intervals to cooler and cooler parts of the chamber. It takes twelve hours to anneal wine-glasses, but much longer for large objects. Plate-glass requires to be two weeks in the kiln before it is properly annealed. Badly annealed glass shows itself in numerous ways. A basin of thick glass left in an ordinary room will sometimes break spontaneously during a cold night. Plates of glass placed, on account of their apparent strength, in floors to admit light to cellars, have occasionally cracked to pieces during sharp frost. Hot water, as is well known, often breaks tumblers.

Metals under various circumstances require to be annealed. Hollow ware of cast-iron, before it can be turned bright for tinning, must be softened by the annealing process. The old way of doing this was a rough and ready one. Large and strong iron pots which contained the ware were placed on gratings in the open air, and the whole covered over with coke, all interstices both within and without the pots being filled up with coal-dust, to prevent as far as possible the access of air. The coke was then fired and kept at a red heat for about twenty-four hours, after which the pile was allowed to cool. For many years, however, hollow ware has been annealed in an oven not much unlike that used for glass. Large iron-castings are kept covered up in their moulds, to prolong the time of cooling—sometimes with hot cinders—for a month or more. Like thick glass, these occasionally break spontaneously.

What are called malleable-iron castings are articles usually of limited size, made of cast-iron, which are afterwards annealed. They are covered over with powdered hæmatite ore, and subjected to

various degrees of heat for about ten days, when they become quite malleable.

Metals, when undergoing the process of rolling, hammering, or stamping, require annealing. In the manufacture of sheet-brass, the rolling, by which it is gradually reduced in thickness, makes it so hard that it has to be annealed several times during the operation. But in this case the annealing is conducted in a reverberatory furnace, and lasts only a few minutes. The sheet-brass is simply raised to a blood-red heat and then withdrawn, this being sufficient to restore the ductility of the metal. Articles made of brass and other metals by stamping, and particularly such articles as require many blows of the stamp to bring them into shape, are repeatedly annealed during the process. In the case of coins, as they receive only one blow of the coining-press, the metal blanks are annealed before they are stamped. A steel matrix, from which die-punches are impressed, being usually a work of much labour, is put through the annealing process after every few blows in the die-press. German silver, which is composed of three kinds of metal, is difficult to anneal from its tendency to crack in the process.

Annealing is also used in gold-beating, in wire-drawing, in nail-making, and many other arts. Tin, lead, and zinc are annealed by the use of boiling water, and steel tools by immersion in hot oil, both liquids being allowed to cool slowly. Many experiments have shown that steel boiler-plates and ship-plates are made stronger by annealing them in oil, or in melted lead, or by simply heating them to redness in a slow furnace, and afterwards covering them up with sand or ashes to prevent them cooling rapidly or unequally. Tempering has been called the inverse process of annealing.

Annecy, chief town of the French department of Haute-Savoie, at the north-western extremity of the Lake of Annecy, 22 miles S. of Geneva, and 25 miles NW. of Aix-les-Bains by rail. The Lake of Annecy, 1426 feet above the sea, is about 9 miles long; its waters flow by the Fier to the Rhone. Annecy was transferred with Savoy to France in 1860. It has foundries, potteries, paper, cotton, woollen mills, &c. The most remarkable buildings are the castle, once the residence of the Counts of Geneva; the old bishop's palace; the cathedral (1525); the hôtel-de-ville, with a statue near it of Berthollet (q.v.) by Marochetti; and the modern church of St Francis, with relics of St Francis de Sales, who lived here. Here lived also Rousseau with Mme. de Warens, and here died Eugène Sue in exile. Pop. 15,000.

Annelida (Lat. *anellus*, 'a little ring'), a term due to Lamarck, and definitely applied by Cuvier to the higher red-blooded worms. The term is no longer generally used in classification, but where it does persist, it usually includes the three classes —Chætopoda, Discophora, and Gephyrea. See WORMS.

Annexation is the adding or joining to a state of territory which was previously independent or in possession of another power. It is generally, though not always, the result of war. As important annexations in recent times may be mentioned that of Oudh in 1856, which was one of the causes of the Indian mutiny; that of Savoy by France after the war with Austria in 1859; that of Alsace-Lorraine by Germany in 1871; that of Bosnia-Herzegovina by Austria-Hungary in 1908; and that of Korea by Japan in 1910; and many changes in 1919–20.

Annobon, or ANNABON, the smallest of the four islands in the Bay of Biafra, belongs to Spain. Its volcanic mountains render it picturesque, and it is well wooded and fertile. Area, over 6 sq. m.; pop. about 1400 negroes, professedly Catholics. They do little, and are dying out. There is some fishing. The island was discovered by the Portuguese on New-year's Day (*Anno Bom*) 1471.

Annonay (ancient *Annoniacum*), a town of the department of Ardèche, France, 37 miles S. of Lyons. The chief manufacture is that of paper; there are also manufactures of gloves, silk and cotton twist, and woollen cloths; and tanning is carried on. The paper-mills of Annonay were established by the father of the celebrated aëronauts Montgolfier (q.v.), who were born here. The situation of the town is picturesque. Pop. 13,500.

Annual, a term applied to plants which complete the whole course of their development in one season, within which they germinate, flower, perfect their seeds, and perish, never to spring again from the same root. The whole duration of life in the plants thus designated is indeed generally much less than a year, and in temperate and cold climates falls within the brief period of the summer months. Some species are generally annual, and others generally biennial; but whether an individual plant is annual or biennial often depends upon the accidental circumstance of the season at which the seed germinates, and may therefore be artificially determined by the time of sowing. Peculiar circumstances also sometimes convert annual into biennial, or even perennial plants; and those which are mere annuals in one climate, are perennial or even shrubby in another—e.g. the Castor-oil plant. Most kinds of corn are the produce of annual grasses; some of which, however, as wheat, in certain circumstances, prove of longer duration. The *annuals* cultivated in our flower-gardens are very numerous; and many species, both native and foreign, are among our most beautiful flowers.

In Gardening, annuals are divided into three classes—viz. *hardy*, *half-hardy*, and *tender*. The last named are those which can only be cultivated in the temperature of a stove or greenhouse, and consist of such as the Cockscomb (*Celosia cristata*), the Melon (*Cucumis Melo*), and many others. The half-hardy class consists of those kinds that, while they will flower and perhaps perfect their seeds in the open air, need the assistance of artificial heat and protection in the early stages of their growth. The China Aster (*Callistephus chinensis*), Tobacco (*Nicotiana tabacum*), Drummond's Phlox (*Phlox Drummondii*), and Marigold (*Tagetes*), are familiar examples of this class of annuals. The first named or hardy class is composed of those that may be sown in the open ground, and will germinate and flourish from first to last without any artificial protection or aid. Nemophila, Lupine (*Lupinus nanus* and others), the Large-flowered Flax (*Linum grandiflorum*), Candytuft (*Iberis umbellata* and others), the various Godetias, Gilias, and the Rocket Larkspur (*Delphinium Ajacis*), are well-known members of the hardy group. So hardy are many of these that they may be sown in autumn and bloom the following spring, thus greatly prolonging the enjoyment of the flower-garden, as these will last in bloom till the ordinary spring-sown plants come in.

Californian annuals are unquestionably the most valuable for those who must rely solely on hardy flowers for the adornment of their gardens.

Annual Register, a yearly record of public events, which was commenced in 1759, and has been continued to the present time. It was projected by Robert Dodsley the bookseller, and for nearly thirty years Edmund Burke wrote the survey of events. Indexes have been published at various periods, and the work is now published by Messrs Longmans. Preceding works of the same kind were Boyer's *Political State of Europe* (1711–39),

and the *Historical Register*, a quarterly (1716–38). A rival work, *The New Annual Register*, started in 1781 by Dr Kippis, came to a close in 1825. The *Edinburgh Annual Register* (1808–27) had among its contributors Sir Walter Scott and Southey.

Annuals, the name given to a class of sumptuous books, much in demand during the first half of the nineteenth century, for Christmas, New-year, and birthday presents. They were usually illustrated with good engravings, and often contained prose and poetry by most of the best writers of the day. The first of them, the *Forget-me-not* (see ACKERMANN), was begun in London in 1822. The following year two others made their appearance, *Friendship's Offering* and *The Graces*, the latter containing a series of elegant poems on the Months by the Rev. Dr Croly. The *Literary Souvenir*, however, begun in 1824 by Alaric A. Watts, was the first really beautiful book of this kind, and after its appearance the annuals became every succeeding year more and more attractive. It was followed by the *Amulet*, started by S. C. Hall, and edited by his wife; the *Winter's Wreath*, a provincial annual; and the aristocratic *Keepsake*, commenced in 1827 by Charles Heath, the eminent engraver. The last was published at a guinea, instead of the usual twelve shillings of former annuals, and was throughout one of the most successful of its class. Its first editor was W. H. Ainsworth, and among his successors were Lady Emmeline Stuart Wortley and the Countess of Blessington. In its second year, Scott refused the editorship at a salary of £800, but had £500 for a few contributions. The first volume of the *Book of Beauty*, begun in 1833, and long one of the best of the series, was written by Letitia E. Landon; its second and all succeeding issues by the Countess of Blessington. Other annuals were the *Picturesque Annual*, *Hood's Comic Annual*, the *Children of the Nobility*, the *Juvenile Album*, the *Musical Bijou*, the *Drawing-room Scrap-book* (the last edited at first by Letitia E. Landon, afterwards by Mrs Howitt, and latterly by Mrs Norton), the *Juvenile Scrap-book*, the *Oriental Annual*, the *Historical Annual*, the *Gift*, and the *Token;* the last three, American productions. For several years, nearly £100,000 per annum was expended on the production of annuals, and 150,000 copies of them were yearly sold. The sale of the *Forget-me-not* alone was at one time 20,000 copies. In 1829 no fewer than seventeen were published. In 1840 their number had dwindled to nine. From this time the demand for annuals steadily declined, and publishers gradually discontinued them. The *Literary Souvenir* had ceased issue in 1834, while the *Forget-me-not* saw its twenty-second year. The *Book of Beauty* and the *Keepsake* (of 1856) were the last of their race.—To a different category belong the Almanacs (q.v.) and various year-books of reference (*Statesman's Year Book*, *Who's Who*, &c.).

Annuity is the term employed to describe a payment generally (but not necessarily) of uniform amount falling due in each year during a given term, such as a period of years or the life of an individual; and payable, either in one sum at the end of the year, or by half-yearly or other instalments. Annuities differ from other investments in this, that the capital sum invested or 'sunk' in the purchase of an annuity is not returnable when the annuity ceases to be payable—a portion of it is, in fact, returned in each payment of the annuity. By thus sacrificing the capital, a larger income is obtained, and hence the purchase of a life annuity is resorted to by persons whose main object is to secure a competency for themselves. For example, a male aged 60 by investing £1000 in 2½ per cent. consols when these were standing at 55½ would enjoy throughout his life an income of £45 per annum, whereas the £1000 used as the purchase price of an annuity from the government would give him an income of £89, 11s. Annuities are divisible into two classes: (1) *Annuities certain*—that is, for a fixed term of years, subject to no contingency whatever, and depending for their value simply upon the operation of compound interest; and (2) *Annuities contingent*—that is, annuities depending not merely upon the operation of compound interest, but also upon the continuance of some status, such as the life of a person, whose duration can only be estimated by the theory of probabilities, on the average of a large number of cases. The former class is dealt with under the article INTEREST; the theory of annuities certain being, in fact, a branch of the theory of compound interest.

The LIFE ANNUITY (which is generally meant when the simple term 'annuity' is employed) is the principal example of the latter class, and to it our remarks must be mainly directed. In scientific treatises on the subject, an annuity is always assumed, unless otherwise described, to consist of an annual income of £1, or more simply of 1, payable at the end of each year survived—the amount for any larger sum being easily derived therefrom. When, in addition, a proportion of the year's annuity is payable up to the day of death, the annuity is said to be *complete* — the ordinary annuity being sometimes, for distinction, referred to as a *curtate* annuity. By the Apportionment Acts, however, annuities are held as accruing from day to day, and therefore as apportionable or complete unless otherwise specified—the legal and the scientific practice being thus at variance in this respect. When the first payment is due in advance, the annuity is known as an *annuity due;* and on the other hand, when the first payment is not to be made until the expiry of a certain number of years, it is called a *deferred annuity.*

The honour of having been the first to place the calculation of life annuities on a scientific basis, by applying the doctrines of probabilities and of compound interest to a mortality table deduced from the recorded statistics of an actual community (Breslau), belongs to the celebrated astronomer royal, Halley. His monograph on the subject is printed in the *Philosophical Transactions* for January 1693. When Halley wrote, the Revolution government was endeavouring to complete the raising of a sum of a million sterling, by the issue of life annuities, offering 14 per cent. during the lifetime of any nominee, without restriction of age; thus appraising selected life-interests at only a trifle more than seven years' purchase. Notwithstanding the fact that Halley's table showed the life-interests of young nominees to be worth upwards of thirteen years' purchase, or nearly double the amount charged, money found its way but slowly into the national treasury. Adam Smith attributes this to the supposed instability of the government; but it may doubtless also be traced to ignorance or distrust of Halley's conclusions on the part of his countrymen. Certain it is, that at a much later period (1746), an issue of exchequer life annuities—again on ruinous terms, and without restriction of age—was left to be taken up mainly by Dutchmen, who, being well informed on the subject of life contingencies through the writing of Kerseboom, nominated children, and mostly young females; while the English subscribers selected their nominees from either sex, and of any age, up to 50 or 60 indifferently.

In 1808 the National Debt Commissioners commenced the granting of life annuities, graduated according to age, on the basis of the Northampton table of mortality (see INSURANCE). Previous

annuity transactions had resulted in heavy loss, and it might have occurred to those responsible for the new departure, that that loss was not likely to be retrieved by adopting a table which had been proved to yield a large profit when used as a basis for life-assurance premiums! Not until 1828, however, and after Mr Finlaison, the government actuary, had pointed out that the loss from the annuity business was advancing at the rate of £8000 per week, was the Northampton table abandoned. Shortly thereafter, new tables of annuities, deduced from the past experience of the government, and distinguishing between male and female lives, were issued. Since then the rate of mortality prevailing among government annuitants has been re-investigated four times, the most recent investigation being that covering the 20 years 1900–20, which was published in 1924. The annuity prices now charged by the government are based on this experience, modified to allow for lighter mortality since the successive investigations have shown steady improvement in the vitality of annuitants, and to base annuity prices on an actual mortality experience without making allowance for future improvement would be unsafe. Life assurance offices also sell annuities, and an investigation into the mortality of their annuitants over the 20 years 1900–20 was made by a Joint Committee of the Institute of Actuaries and the Faculty of Actuaries in Scotland. The same feature of improving mortality was present among life office annuitants, and in 1924 the Joint Committee published their Forecast Table as a suitable mortality basis for prices of annuities sold in that year.

The interest basis used in the calculation of government annuities is dependent on the prices of consols at date of purchase. The following table gives sample prices while the price of 2½ per cent. consols is not less than £55, 10s. but does not reach £57, 2s. 6d. (i.e. interest yield 4½ to 4⅜ per cent.):

Cost of an Immediate Life Annuity of £1.

Age last Birthday.	Male Life.	Female Life.
40	£16 17 1	£17 17 1
45	15 14 0	16 17 9
50	14 7 1	15 15 0
55	12 16 7	14 8 2
60	11 3 4	12 17 1
65	9 10 6	11 3 4
70	7 18 8	9 6 11
75	6 9 2	7 11 11

Government annuities are payable by quarterly instalments on 5th January, April, July, and October of each year, and one quarter's payment is payable to the annuitants' representatives after death. Life office annuity quotations are usually for annuities payable by half-yearly instalments, the first six months after purchase and the last that paid in the half-year preceding death, but life offices will grant annuities payable as purchasers may wish at the prices necessary to meet their requirements.

In the Preface to the Report on the Mortality Experience of Government Life Annuitants, 1900–20, it is stated that for the 10 years 1913–22 the sums received by the government for life annuities of all descriptions amounted on an average to about £680,000 per annum, while life assurance offices received an average sum of over £2,000,000 annually. In 1926 the sum received by life assurance offices established in Great Britain for the purchase of annuities was over £2,250,000, while in the same year these offices paid out under their existing annuity contracts just under £3,000,000.

There is another important practical aspect in which the subject of life annuities may be viewed. While the government and corporate bodies granting annuities rely upon the principle of averages for the satisfactory working out of their transactions, a purchaser of an isolated annuity must proceed differently. He requires to protect himself against the loss of his capital through the early death of the annuitant, and this can only be done by effecting an assurance on the life of the latter, without which the transaction becomes a speculation and not an investment. Suppose a complete life annuity of £50 to be offered for sale, and an individual to be willing to purchase it at such a price as will yield him on his outlay 5 per cent. free of income tax; then the first thing he would require to ascertain would be the rate of premium at which the life of the annuitant could be assured. This being found to be, say, 3 per cent. per annum, the intending purchaser would next proceed to calculate the sum, X, the interest upon which, together with the premium to assure its return at death of the annuitant, would amount to the net sum received annually from the annuity of £50. Thus, on the assumption that income tax is 4s. in the £ and such net sum consequently £40:

$$(5+3)\times X \div 100 = 40 \therefore X = 500.$$

The premium to assure £500 is £15, and the interest on £500 at 5 per cent. net is £25, together making up the net amount of £40 received annually under the annuity. It should be borne in mind, however, that the £500 being the total outlay, the sum that can be paid to the seller is £485, being the former sum less £15, the amount of the first premium which requires to be paid in advance to the assurance office.

Of other forms of contingent annuities a single example may be given. With many widows' funds it is a rule that the widow ceases to draw her annuity if she marries again. The calculation of an annuity ceasing either at death or upon re-marriage leads to no theoretical difficulties; but in order to obtain satisfactory results, it is necessary to have carefully compiled statistics of the ratio of re-marriage among widows of various ages.

In the law of England, the right, whether created by a deed or a will or a statute, to receive a definite annual sum of money may be, strictly speaking, either an annuity or a rent charge. If the source from which the money is payable yearly, or at any rate periodically, is exclusively or primarily personal estate other than leaseholds, the right or interest is an annuity and is in the nature of personal estate. If the only source from which the money is directed to be paid be land, the right or interest is a rent charge and is in the nature of real estate. By the Judgments Act, 1855, any annuity or rent charge granted, otherwise than by marriage settlement or will, for a life or lives, was not to affect any lands as to purchasers, mortgagees, or creditors, unless registered. The Land Charges Act, 1925, sec. 4, provides that such annuities or rent charges shall not be entered in the register of annuities after 1st January 1926; but under sec. 5, an annuity which before that date was capable of being registered is void as against a creditor or a purchaser of any interest in the land charged therewith, unless it is for the time being registered in the register of annuities or the register of land charges. Where an annuity is given *simpliciter*, it is an annuity for the life only of the annuitant; or, in the case of joint annuitants, for the life of the longest liver of them.

In Scots law, an annuity is a right to receive from year to year a certain sum. It is not necessarily limited to the lifetime of the recipient, for it may be given for a number of years or even in perpetuity. It may be charged on heritable estate as well as on moveable estate. An annuity is a burden on the heritable succession of the person liable to pay it. An annuity may be created by

testament. To create an annuity by instrument *inter vivos*, a bond or probative writing is, as a general rule, necessary. The annuitant under a trust is entitled, if the annuity be granted for his or her maintenance, to have the trust kept up for security.

Annuity-tax, a local impost for the payment of the salaries of the Established clergy of the city of Edinburgh. It was first established on a limited scale by an act of the year 1661; and was extended in its sphere of operation by an act of the legislature as lately as 1809. It amounted at one time to 6 per cent. on the rents of houses and shops within the royalty. It was a peculiarity of this tax that the members of 'the College of Justice,' including the lawyer class generally, enjoyed an exemption from it, as a relic of an ancient privilege by which they were induced to reside and hold the courts of law in Edinburgh. The tax was reduced in 1860; and, under an act passed in 1870, it was redeemed by payment of £56,500 by the Corporation to the Edinburgh Ecclesiastical Commissioners.

An'nulet (Lat. *annulus*, 'a ring'), a term in Architecture for a small fillet or band which frequently surrounds a column, &c. The annulet, a ring, is a charge in Heraldry. See CADENCY.

Annuloida, Annulosa. See WORMS.

Annunciation, the tidings brought by the angel Gabriel to the Virgin Mary of the incarnation of Christ. Also the festival kept by the church, in commemoration of this event, on the 25th of March. The festival was instituted about the beginning of the 7th century, those sermons of Athanasius and Gregory Thaumaturgus in which it is mentioned being now rejected as spurious; and the earliest certain references to it occurring in the acts of the Tenth Council of Toledo (656), and of the Trullan Council (692). In England, the festival is commonly called Lady Day (q.v.). Among the Jews, this title is given to a part of the ceremony of the Passover.

The *Order of the Annunciation*, now the highest Italian order, was instituted in 1360 by Amadeus VI., Duke of Savoy, and in 1725 was made the first order of the kingdom of Sardinia. The king is always grand-master. The knights, who are not limited in number, must be of high rank, and already in the orders of St Mauritius and St Lazarus.

Annunzio. See D'ANNUNZIO.

Annus Deliberandi, in Scots law, was the period of a year allowed to an heir to deliberate whether he would accept the inheritance with the burden of his predecessor's debts. But by recent legislation the period is shortened to six months, so that at the end of that time the creditors of the deceased may proceed to attach the estate, whatever the heir may resolve to do. Since 1874 no heir is liable for debts beyond the value of the estate, and the annus has become unimportant.

Anobium. See BORER and DEATH-WATCH.

Anode (Gr. *ana*, 'up,' and *hodos*, 'a way'), a term (see ELECTRICITY) introduced by Faraday to designate the positive pole, or that electrode by which in electrolysis the current enters the electrolyte, or body being decomposed; as opposed to *cathode*, the negative pole. The same names are applied to the poles of vacuum tubes.

An'odyne (Gr. *an-*, 'not,' and *odynē*, 'pain'), a medicine used to assuage pain. Anodynes may act either on the nerves and nerve-terminations (aconite, belladonna, cocain, &c.); on the brain (chloral, Indian hemp); or on all these parts (opium, bromide of potassium). See ANÆSTHESIA, NARCOTICS, SLEEP.

Anointing. See BAPTISM, CHRISM, CORONATION, EXTREME UNCTION.

Anomalistic Year is the interval that elapses between two successive passages of the earth through its perihelion, or point of nearest approach to the sun. If the earth's orbit had a fixed position in space, this period would correspond with that of a sidereal revolution, or the time the earth takes after leaving any point of the heavens to return to it again; but the disturbing influence of the other planets causes the perihelion to advance slowly (11″·8 annually) in the direction of the earth's motion; so that the anomalistic year is longer (4 minutes 39 seconds) than the sidereal. The length of the anomalistic year is therefore 365 days, 6 hours, 13 minutes, 49 seconds.

Anom'aly (Gr. *anomalia*, 'irregularity'), the angle measured at the sun between a planet in any point of its orbit and the last perihelion. It is so called because the first irregularities of planetary motion were discovered in the discrepancy between the actual and computed distance. The anomaly was formerly measured from the aphelion, the opposite point of the ellipse; but from the fact that the aphelia of most of the comets lie beyond the range of observation, the perihelion is now taken as the point of departure for all planetary bodies.

Anomodonts, an order of extinct reptiles, first found in the Permian and common in the Triassic, intermediate between labyrinthodont amphibia and monotreme mammalia. They are mostly small, and are named from the anomalous dentition of the first discovered genera.

Anona. See CUSTARD-APPLE.

Anona'ceæ, the Custard-apple (q.v.) family, archichlamydeous dicotyledons, mostly tropical trees and shrubs. Usually the fruit is succulent and delicious, but sometimes dry and pungent.

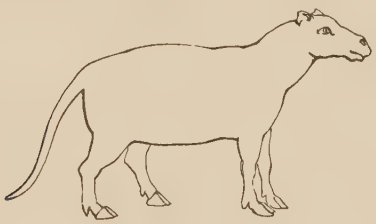
Anon'ymous (Gr., 'nameless'), a term applied to a book the author of which does not give his name; when an assumed name is given, the term PSEUDONYMOUS is used. Works of this class constitute one of the great difficulties of bibliography.

In Great Britain, till the foundation of the *Fortnightly* and *Contemporary* Reviews (1865–66), political articles were generally anonymous, as also was most of the literary criticism, till the starting of the *Academy* (1869). It is generally admitted that anonymity secures the independence of the critic, and enables him to write with greater freedom, vigour, and power; but it is true that he often abuses his advantage, and gratifies under the veil of the anonymous his own personal pique. The article on 'the fleshly school of poetry' in the *Contemporary Review* for October 1871, which drew upon its author such merited castigation from Dante G. Rossetti in his famous letter to the *Athenæum* on 'the stealthy school of criticism' (December 16, 1871), was an example of an attempt to preserve anonymity even in a magazine where the articles were signed—its author, Robert Buchanan, having used the pseudonym of 'Thomas Maitland.' Perhaps the most intolerable abuse of anonymity is the anonymous letter, which, even when the writer is known, is legally punishable only in so far as it is slanderous or comes under the law of Libel (q.v.). See Barbier's *Dictionnaire des Ouvrages Anonymes et Pseudonymes* (Paris, 1806, 3d ed. 1872–79), which embraces the titles of about 24,000 works, with the names of those who are assumed or known to be the authors; the indexes to *Notes and Queries;* 'Olphar Hamst's' *Handbook of Fictitious Names* (1868); Cushing's *Initials and Pseudonyms* (New York, 1885), with his companion volume, *Anonyms* (1887); Halkett and Laing's *Dictionary of Anonymous and Pseudonymous Literature* (4 vols. 1881–87; enlarged by Kennedy, Smith, and Johnson 1926 *et seq.*); Stone-

hill, Block, and Stonehill's *Anonyma and Pseudonyma* (4 vols. 1926–27). The standard German work is Holzmann and Bohatta's *Deutsches Anonymenlexikon* (1902 *et seq.*).

Anopheles. See GNAT, MALARIA.

Anoplotherium, a genus of extinct Artiodactyla, established by Cuvier from bones in the gypseous strata of the Oligocene formation near Paris. They are found also in the Isle of Wight and elsewhere. The teeth differ from those of all other Ungulates, extinct or recent. There are six incisors, two canines, eight præmolars, and six molars in each jaw—the dental formula thus agreeing with that of the fossil genus Palæotherium (q.v.); but the teeth are arranged in a continuous series without intervening vacancies—a circumstance very remarkable, as it does not occur in any existing quadruped, but now appears in man alone. The molars of the upper jaw have quadrate crowns; those of the lower are marked with a double or triple crescent of enamel, which forms prominent ridges. In some respects, the teeth resemble those of the rhinoceros, and exhibit generalised selenodont characters—that is to say, the teeth are crescentic, like those of the Ruminants (q.v.), or ruminating quadrupeds, between which and the non-ruminant Artiodactyla the Anoplotherium has been thought to form a connecting



Anoplotherium.

link; but in some of the species originally included in this genus, and which are now sometimes ranked along with it under the name *Anoplotheroids*, the teeth exhibit peculiarities which have led to the supposition that their food may not have been exclusively vegetable. The snout is not much elongated, and it is evident that there was no proboscis. The feet are terminated by two toes, as in the Ruminantia; but they have always separate metacarpal and metatarsal bones, not a single *canon* bone. Several species of Anoplotherium have been determined—the size of the animal being about that of the ass. Closely allied to Anoplotherium are certain other genera, of which Dichodon and Dichobune are the most important. These, with Anoplotherium, form the family of the Anoplotheridæ.

Anquetil, LOUIS PIERRE, a French historian, born at Paris in 1723, took orders, and, after filling educational posts at Reims and Senlis, got a government appointment under Napoleon. He died, a member of the Institute at Paris, 6th September 1806. He wrote a history of Reims and numerous memoirs on periods of French history; but his great work is his *Histoire de France* (14 vols. 1805), continued by Bouillet to 1862 in 6 additional volumes.

Anquetil-Duperron, ABRAHAM HYACINTHE, brother of the preceding, a French orientalist, was born at Paris, December 7, 1731. He first studied theology, but finally devoted himself to oriental languages, and such was his passion for this study that he enlisted as a private soldier for India at twenty-three in order to gratify it. The government having been made aware of this proof of the scholar's ardour, made him an allowance so as to enable him to proceed independently. After an extensive journey in India, he fixed his residence at Surat, where he gained an intimacy with the Parsee priests, and obtained from them manuscripts of the Zend-avesta and the later Persian religious books. After the fall of Pondicherry (1761), he returned to Europe, carrying with him nearly two hundred manuscripts, and soon obtained through the influence of the Abbé Barthélemy a situation in the Bibliothèque Royale. His *Zend-avesta, ouvrage de Zoroaster*, appeared in 1771, and being the first translation ever made into a European tongue, attracted much attention. This translation has long been superseded, as it was made, not from the original, but from the more or less inaccurate Persian translation of his Indian teacher. Another important work is his *Oupnek'hat* (1801–2), a Latin translation of two manuscripts which contained an old Persian version of the chief Indian *Upanishads*. It was from this translation that Schopenhauer drew that intimate acquaintance with Indian philosophy which influenced his own system so profoundly. Anquetil-Duperron died at Paris 17th January 1805.

Ansars, or NOSAIRIS, an Arab sect in the hill-country north of Lebanon, also now in the plain, at Antioch, at Tripoli (in Syria), and in Cilicia. They may be named from Mohammed ibn Nosair in the 9th century; though Dussaud in his great work on them (Paris, 1910) thinks the name is a corruption of Nassiâri, 'Nazareans,' because of the admixture of Christianity and Gnosticism with their Shiite Mohammedanism and old Syrian nature-worship. (See DRUSES for another eclectic Syrian sect.) First heard of in the 10th century, they not merely reverence Ali, the nephew of Mohammed, but practically deify him, and pay divine honours to his sons or emanations, thus recognising a kind of Trinity. They believe in a Mahdi or Messiah to come, the twelfth and last of the imams or emanations of the divine spirit, and they keep secret their religious rites and grades of initiation. They have special religious books; in their prayers they turn towards the rising and the setting sun; they believe in a constant transmigration of souls, which for the faithful is a process of purification until they reach at length the higher and more perfect states of earthly life, and find places as brilliant stars on the horizon. Those, however, who have derided or made known the sacred mysteries, or who have denied the divinity of Ali, are doomed to death, or are transmigrated into Jews, Christians, or Mohammedans, or into dogs, swine, and asses. The Ansars often defended their freedom with bravery against the Turks. The name Ansars was also applied to the first adherents of Mohammed.

Ansbach (in England often ANSPACH), a town of Bavaria, on the Rezat, 25 miles SW. of Nürnberg. It has manufactures of furniture, machinery, automobiles, buttons, &c., while during the 18th and 19th centuries porcelain was manufactured. There is a brisk horse and cattle market. The situation is pleasant, but there are no remarkable buildings, except the deserted palace of the former margraves of Ansbach, surrounded by gardens, and the church of St Gumpert, said to occupy the site of a church erected in the 8th century. The margraves of the old principality of Ansbach (see BAIREUTH, CRAVEN) were a branch of the family of Hohenzollern. The last of them gave up his possessions in 1791 to Prussia; and in 1807 Napoleon transferred Ansbach to Bavaria. Pop. (1925) 21,923.

Ansdell, RICHARD, animal and landscape painter, was born at Liverpool in 1815. Abandoning business for art, he exhibited at the Royal Academy in 1840, and at the British Institute in 1846. A visit to Spain with John Phillip in 1856

led to a series of Spanish subjects. He thrice won the Heywood Medal at Manchester, and a gold medal at the Paris Exhibition of 1855. He was elected A.R.A. in 1861, and R.A. in 1870. He died 20th April 1885.

Anselm OF CANTERBURY, a scholastic philosopher, was born at or near Aosta, in Piedmont, in 1033. At the age of fifteen, Anselm ardently desired to enter the monastic life, but his father sternly refused his consent. After his mother's death, he resolved to escape from his father's oppression, and to seek a career across the Alps. Here he spent three years in Burgundy, and being attracted by the reputation of Lanfranc, he went in 1060 to study at the monastery of Bec, in Normandy. Three years after, he succeeded his master as prior, and in 1078 became abbot of this monastery, the most famous school of the 11th century. Lanfranc, who in the meantime had gone to England, and become Archbishop of Canterbury, died in 1089; and the diocese remained four years without a successor, till in 1093 Anselm was appointed. He was distinguished both as a churchman and a philosopher. His numerous embroilments with William Rufus and his successor, and the unbending spirit which he displayed in these, even when subjected to banishment, indicate the vigour and resoluteness of his character, as much as his writings exhibit the depth and acuteness of his intellect. Exiled by Rufus, Anselm returned at Henry's urgent request; but the new monarch's demand that he should renew his homage, and be again invested with his archbishopric, was met with an absolute refusal, and led to a second exile of two years' duration. In 1105, however, Anselm's threat of excommunication led to the reconciliation of king and prelate, and the compromise was devised which, in 1122, was accepted by pope and emperor at Worms (see INVESTITURE). Anselm was a second Augustine, superior to all his contemporaries in sagacity and dialectical skill, and equal to the most eminent in virtue and piety. Embracing without question the doctrines of the church, mostly as stated by Augustine, and holding that belief must precede knowledge, and must be implicit and undoubting, he yet felt the necessity of a religious philosophy, urged the duty of proceeding from belief to knowledge, and sought to reduce the truths of religion into the form of a connected series of reasonings. It was for this purpose he wrote his *Monologion*. In his *Proslogion*, he strove to demonstrate the existence of God from the *conception* of a perfect being, as Descartes also subsequently did. His *Cur Deus Homo* (Eng. trans. by Prout, 1887) argues the necessity of the Incarnation, all subsequent speculation on which it has profoundly influenced (see ATONEMENT). Besides his philosophical treatises, his *Meditations* and *Letters* have come down to us, revealing his humble fervent faith, and the tender sympathy of his nature. He died April 21, 1109, and was buried next to Lanfranc at Canterbury. In 1494 he was canonised, but Dante had long before placed him among the greatest saints in paradise. In 1720 Clement XI. expressly placed him in the list of church authorities.

See Lives by Church (1870, often reprinted); Rule (1883), who edited for the Rolls Series Eadmer's two lives of Anselm (1884); Ragey (in Fr. 1890); there are books discussing Anselm's philosophy by Rigg (1897), de Vorges (in Fr. 1901); there are translations from Anselm by S. N. Deane (*Cur Deus Homo* and other pieces, 1903) and others. See also the articles SCHOLASTICISM, WILLIAM II.

Anser. See GOOSE.

Ansgar (*Anscharius*), the Apostle of the North, was born in Picardy in 801. Under the patronage of Louis le Débonnaire, he went, with his colleague Autbert, to preach Christianity to the heathen Northmen of Sleswick. He suffered many persecutions; but had nevertheless such success that, in 831, the pope established an archbishopric in Hamburg (transferred to Bremen in 847), and Ansgar was appointed the first archbishop. He made several missionary tours in Denmark and Sweden, and died in 865 at Bremen. See his Life by Tappehorn (Münst. 1863).

Anson, GEORGE, LORD ANSON, born 23d April 1697, at Shugborough Park, Staffordshire, entered the navy in 1712, and was made a captain in 1724. In 1739, on the outbreak of war with Spain, he received the command of a Pacific squadron of six vessels, with instructions to inflict whatever injury he could on the Spanish commerce and colonies, and he sailed from England in September 1740. Vessels, crews, and stores were alike indifferent; yet, in spite of all disadvantages, he achieved a brilliant reputation by the heroism, prudence, diligence, and humanity he displayed. With only one ship, and less than two hundred of his original followers, but with £500,000 of Spanish treasure, he returned to Spithead, June 15, 1744, having circumnavigated the globe in three years and nine months. His perilous cruise greatly extended the knowledge of navigation and geography. As a reward for his services, Anson was made Rear-admiral of the Blue (1744); and in 1747, having utterly defeated the French admiral Jonquière, off Cape Finisterre, and captured £300,000, he was made Baron Anson of Soberton, and, four years later, First Lord of the Admiralty. In 1761 he received the high dignity of Admiral of the Fleet. He died at his country seat, Moor Park, Hertfordshire, 6th June 1762. Few works have been so popular as Anson's *Voyage round the World* (1748), of which, whether edited by Walter or Robins, he himself was virtually the author. See his Life by Sir John Barrow (1839), or that by Captain W. V. Anson (1912).

Ansonia, a city co-extensive with Ansonia town, New Haven county, Connecticut, lies on both sides of the Naugatuck River, 2 miles above its confluence with the Housatonic, and 12 miles W. of New Haven by rail. It has manufactures of iron, brass, and copper goods, clocks, electrical goods, webbing and knit goods, carriages, and hardware. Pop. 18,000.

Anspach. See ANSBACH.

Ansted, DAVID THOMAS, geologist, born in London, February 5, 1814. After gaining a fellowship at Jesus College, Cambridge, he devoted himself to geology under Sedgwick, in 1840 was appointed to the chair of Geology in King's College, London, and was elected F.R.S. In 1845 he became attached to the Indian military school at Addiscombe, and the college for civil engineers at Putney. From this time until his death, through a carriage accident near Woodbridge, in Suffolk, May 13, 1880, he devoted his studies to the economic applications of geology, and was much consulted in great mining and engineering operations. His works on his chosen subject were numerous and popular.

Anstey, CHRISTOPHER, born in 1724, was educated at Bury St Edmunds, Eton, and King's College, Cambridge, of which he was a fellow from 1745 to 1754. In 1766 he published the *New Bath Guide*, whose fun and humour—somewhat faded now—achieved a success approached by none of his subsequent poems. He died in 1805.

Anstruther, EASTER and WESTER, two contiguous royal burghs on the coast of Fife, 9 miles south of St Andrews. Fishing and fish-curing are the staple industries, the harbour (1866–77) being at Cellardyke. East Anstruther was the birth-

place of Dr Chalmers, Tennant the poet, and Goodsir the anatomist. With the other St Andrews burghs, they returned a member to parliament till 1918, when they were merged in the county. Joint pop. 1600; with Kilrenny, 3600.

Answer, in music, is the repetition by one voice or instrument of a theme proposed by another.

Ant. Ants (*Formicidæ, Myrmicidæ*) are a group of Hymenopterous insects, in the same order as wasps and bees, which they resemble, not only in general structure, but in the high evolution of their instinctive habits and social life. The word 'ant' is contracted from the old-fashioned Saxon word *emmet;* and 'pismire' is another almost obsolete term. The white ants or Termites (q.v.) are members of an entirely different order—Neuroptera. The ant family is represented by between two and three thousand different forms, widely distributed in temperate and tropical countries. Several sub-families are distinguished: (1) Ponerinæ, in which the workers always have a well-developed sting; (2) Dorylinæ, in which the worker's sting is sometimes vestigial; (3) Myrmicinæ, in which the workers have a sting; (4) Dolichoderinæ, in which the sting is usually vestigial; and (5) Camponotinæ, in which the sting is a vestige which serves to support the orifice of the poison-sac. Many fossil ants are known from Tertiary amber.

Different Forms.—Like most bees, ants occur in three different forms—(*a*) the perfect *females* or queens, the mothers of new generations; (*b*) the short-lived *males*, which die soon after the 'nuptial flight;' and (*c*) the great majority of *workers*, which are predominantly females, though rarely sexual, and often exhibit different forms according to the work which they have to do. In some cases, further, there are distinct classes of workers.

Structure.—As in other insects, the body consists of three parts—head, thorax, and abdomen. The head, which of course contains the 'brain,' is, though minute, yet large in proportion.

Life-history.—As in many other insects, there are four chapters in the life-history of an ant—viz. egg, larva, chrysalis, and perfect insect. The

Fig. 1.—A Common Ant (*Lasius flavus*): *a*, queen; *b*, worker; *c*, male; *d*, larva; *e*, pupa. (After Lubbock.)

minute white or yellowish eggs laid by the queen in the ant nest, are hatched in from two to six weeks, and develop into white legless larvæ or grubs. Both eggs and grubs are carefully watched, and the grubs fed, by the ever-vigilant workers. Thanks to the abundant food-supply, which is given them in a prepared form, the larvæ increase greatly both in size and in complexity, and after a period varying from a few weeks to as many months, become pupæ or chrysalids. These may remain naked, or may spin silken robes or cocoons. The nursing care of the workers does not cease; the brood is kept clean, shifted into the sunshine, or carried off in case of danger. Ant pupæ are collected and sold both in this country and on the Continent as food for young birds. After a short while, during which no food is taken, the perfect insects appear, weak and helpless, still dependent upon the kindly aid of the workers, even to free them from their silken birth-robes. For some weeks, in fact, the workers continue to care for them. As in all insects with a similar history, or complete metamorphosis, the insect has attained its full size when it leaves the pupa stage. Left to themselves, the males generally die after fertilising the queens in the nuptial flight, but the queens and workers may live for several years. Great numbers fall victims to other animals—insects, spiders, birds, ant-eating mammals, &c.; and, small as they are, ants are not unfrequently attacked by still smaller parasites.

Food.—The whole food-supply for the inmates of the nest is collected by the industrious workers, or in a few cases by captured slaves of another species. The food chiefly consists either of insects and available animal matter, or of sweet vegetable substances, such as honey, fruit, and sugar. In the Honey Ant, described by M'Cook (see fig. 4), the abdomen is enormously distended with honey, which is forcibly injected by the normal workers, and is afterwards utilised for the young brood. When the honey exudes by accident, it is greedily lapped up by the workers, but if the honey-pot die, both corpse and honey are buried. The squeezed-out honey is said to be sold in Mexican markets as the basis of a drink resembling mead. The harvesting or grain-storing habit, often alluded to in ancient literature, and remaining unquestioned in popular belief, was for a long time regarded with considerable scepticism by scientific investigators. It was questioned in 1747 by the Rev. W. Gould, one of the early students of ants in Britain, and such authorities as Latreille and Hüber believed his hesitation to be thoroughly justified. The barleycorn-like pupæ cocoons suggested the possibility of mistaken observation, while the torpor of ants during the winter of northern countries did not consist with any storing habit. Yet the opinion of the ancients was expressed in unmistakably circumstantial language, as in this regulation as to ant-granaries found in the Mishna: 'The little caves of ants, when in the midst of a standing crop, are adjudged to the owner of the field; of those behind the reapers, the upper part is the property of the poor, the lower of the proprietor.' The opinion of the ancients has been amply confirmed. Thus in 1829 Lieutenant-colonel Sykes noted at Poonah the large heaps of millet-seed stored up by a species of ant which he named *Atta providens.* The same was demonstrated by Moggridge in regard to some ants in the south of Europe, while Dr M'Cook has given a most graphic account of the harvesting habits exhibited by the agricultural ants of Texas. Moggridge also noted that the seeds are somehow prevented from germinating, but if the process should in exceptional cases begin, the ants are clever enough to eat off the radicle.

Ants are especially fond of the sweet secretion which flows out from the plant-lice or Aphides (q.v.); and some species not only tap and tickle the latter to induce them to part with their honey-dew, but keep them, as Linnæus said, as 'cows,' protecting them in sheds, and yet more marvellously caring for their eggs. Several breeds

of aphid 'cows' are thus appropriated and utilised, and apparently regarded by these pastoral ants as distinctly their 'property,' for the possession of which, if need be, they will even fight. Other insects are sometimes similarly utilised. Several naturalists, such as Bates and Belt, have given vivid accounts of the ravages of the Drivers and Hunting Ants. 'The dread of them is upon every living thing. Their entrance into a house is soon known by the simultaneous and universal movement of rats, mice, lizards, cockroaches, and vermin of all sorts. When they are fairly in, we give up the house, and try to await with patience their pleasure, thankful indeed if permitted to remain within the narrow limits of our beds and chairs.' 'Wherever the marauding Ecitons move,' Bates says, 'the whole animal world is set in commotion, and every creature tries to get out of the way. The main column of the army, from four to six deep, moves forward in a given direction, clearing the ground of all animal matter dead or alive, and throwing off, here and there, a thinner column to forage on the flanks.' The blind driver ants of Africa (*Anomma*) are perfect nomads, overcoming every obstacle in their blind march, and even forming 'animated suspension-bridges' over broad streams. Though useful as scavengers, their unchecked multiplication may result in ravages very much the reverse of beneficial. More than a hundred years ago, vast hordes of *Formica saccharivora* appeared in the island of Grenada, and did the greatest damage to the sugar plantations. 'They descended from the hills like torrents, and the plantations, as well as every path and road for miles, were filled with them. Rats, mice, and reptiles of every kind became an easy prey to them; and even birds, which they attacked whenever they lighted on the ground in search of food, were so harassed, as to be at length unable to resist them. Streams of water opposed only a temporary obstacle to their progress; the foremost rushing blindly on certain death, and fresh armies instantly following, till a bank was formed of the carcasses of those which were drowned, sufficient to dam up the waters, and allow the main body to pass over in safety. Even fire was tried without effect. When it was lighted to arrest their route, they rushed into the blaze in such myriads as to extinguish it.' A reward of £20,000 was offered in vain for an effectual means of destroying them; but in 1780 a hurricane which tore up the canes, and exposed their habitations to a deluge of rain, freed the island from this plague. In reference to their food-acquiring habits, ants may be classified as hunting, pastoral, and agricultural—'three types,' as Avebury remarks, 'offering a curious analogy to the three great phases in the history of human development.'

Nests.—Most ants live in chambered nests. These are of very varied construction, from simple heaps of loose material to houses of more or less elaborate architecture. Some simply utilise the shelter of a large stone, under which they burrow, while others weave a hanging silken nest; some bore into old stumps, which they riddle with their tunnels, and others form a home from leaves glued or woven together. The common yellow ant, *F. flava*, makes an underground nest, which looks like a little grassy mound, perforated by innumerable passages, and sometimes a foot in height. The nest of *F. rufa* is often twice as large, and exhibits a thatched dome, with lattice-work shutters and doors which are closed at night. In South America, the ant-hills are sometimes several feet in height, and exhibit internally a marvellously complex and orderly arrangement of chambers and galleries. The so-called 'mason-ants' use soft clay in forming the roofs and partition of their neat chambers, while the 'carpenters' hollow out their houses in trees and shrubs. *F. flava* forms its partition-walls of a sort of papier-mâché of

Fig. 2.—Part of a Gallery, with Ant working on tiptoe: *Pogonomyrmex molifaciens*, the Agricultural Ant of Texas. (From M'Cook.)

sawdust, earth, and spider's web. *F. smaragdina*, an East Indian species, forms its nest of a thin silk-like tissue. *F. bispinosa*, in Cayenne, makes a felt of the down which envelops the seeds of the *Bombax criba;* while an East Indian species, *Myrmica kirbii*, forms a globular nest of a congeries of tile-like plates of cow-dung. *M. nidificans*, in Malabar and Malacca, forms a nest of some papery material which it fixes on a leaf; and the 'umbrella' ant of Brazil was said by Bates to thatch its large mansion (sometimes 40 yards in circumference and two feet in height) with circles of leaf 'cut with accurate precision from coffee and orange trees, which they oftentimes strip bare to carry out their bold architectural designs.' Belt has, however, noted that, in Nicaragua at least, the leaves are stored until they decay and become covered with a fungus which forms the food of the ant. Roads, tunnels, and covered ways are

Fig. 3.—Ant's Nest (a mound disc) with Roads: *Pogonomyrmex molifaciens*, the Agricultural Ant of Texas. (From M'Cook.)

also frequently formed round about the nests for safe and convenient transit. Many communities, sometimes including alien lodgers, may live within the bounds of a large nest, and a single community may contain more than half a million members.

Sexes.—As has been already noted, an ant's nest contains three kinds of individuals—the crowd of workers, the short-lived males, and one or more queen-mothers. The workers are really imperfect females, and besides the queens, some species include a third form of female. Though the queens are the real mothers, Lubbock has proved that in most nests there are a few fertile workers, but their eggs, if they develop at all, seem always to produce males. It is generally supposed that the ants are able, like bees, to determine, by differences of food, &c., whether a given egg will develop into a worker or a queen. In the course of summer, when external conditions are favourable, the winged males and young queens leave the nest in a marriage-flight, during which fertilisation is effected. The columns of myriad insects, rising like smoke, and glittering in the sun, attracted attention long before they were understood.

'Each column looks like a kind of slender network, and has a tremulous undulating motion. The noise emitted by myriads and myriads of these creatures does not exceed the hum of a single wasp. The slightest zephyr disperses them.' During this flight many fall victims to the elements and living enemies. It is still doubtful how the new nests are generally founded, but Lord Avebury showed that an isolated queen-ant is capable of giving origin to a new community, while it appears that in other cases an old-established nest may adopt a fresh queen, secured by the workers when she falls near the nest from her marriage-flight. Several queens may reign together in one nest, and they are always treated with a loyal devotion, associated, however, with a judicious measure of control. The Rev. W. Farren White quotes the following interesting passage from Gould, who has been already referred to as one of the early students of British ants. 'In whatever apartment a queen condescends to be present, she commands obedience and respect, and a universal gladness spreads itself through the whole cell, which is expressed by particular acts of joy and exultation. They have a peculiar way of skipping, leaping, and standing up on their hind-legs and prancing with the others. These frolics they make use of both to congratulate each other when they meet, and to show their regard for the queen.' As among bees, there are a few genera of solitary ants. In these Mutillidæ, the males are winged, the females wingless, and there are no workers. Four forms have been found in Britain, one of which, *Mutilla europœa*, inhabits the nests of humble-bees, on which it appears to be parasitic.

Division of Labour, and Polymorphism.—There is a general division of labour involved in the existence of a caste of workers separate from the males and normal females. But apart from this the workers come to discharge among themselves very different functions. The young and the old, the small and the large, are set apart for different duties. Such division of labour tends, however, to produce difference of form (or polymorphism), just as variety of occupation tends to do among men. Thus it is not surprising to find in some species several types or castes of workers. In the Saüba or umbrella ant of South America, besides males and queens, there are (*a*) small ordinary workers, (*b*) large workers with very large hairy heads, and (*c*) large workers with large polished heads. Bates suggests that the last two kinds are of use in war as passive butts, 'as *pièces de résistance*, serving as foils against onslaughts made on the main body of workers.' In other cases, certain members of the community serve as 'animated honey-pots,' with the somewhat tantalising function

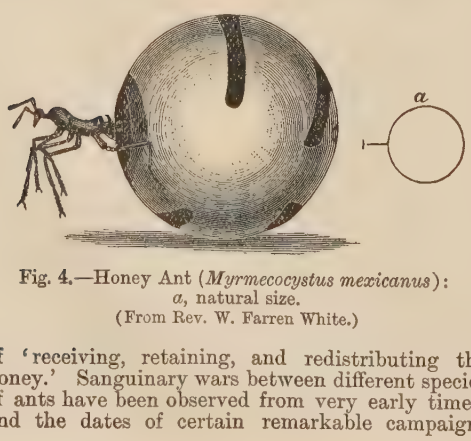


Fig. 4.—Honey Ant (*Myrmecocystus mexicanus*): *a*, natural size.
(From Rev. W. Farren White.)

of 'receiving, retaining, and redistributing the honey.' Sanguinary wars between different species of ants have been observed from very early times, and the dates of certain remarkable campaigns gravely recorded. The observations of the ancients have been verified by Hüber with his characteristic carefulness, and Thoreau gives a graphic account of some of the encounters he witnessed during his life at Walden. In some ant communities, members of other species are captured when young, and used as slaves. As these not only work and forage for their masters, but even feed them, the latter degenerate, and *Polyergus rufescens* is wholly dependent even for its life on its slaves. Lubbock notes how every transition is exhibited between bold marauders and enervated masters—hopeless parasites upon their slaves. Besides the association with aphides already noted, ants tolerate various insect inmates within their nests.

Relation to Plants.—While flying insects, like bees, which carry the fertilising pollen from one plant to another, have played an important part in the evolution of flowers, ants have had an influence of another kind. Visits of ants would in most cases simply mean a loss of honey without any advantage to the plant; it is therefore natural that many plants should exhibit contrivances for warding off the attacks of ants. Moats formed by leaf-cups, curved slippery surfaces, narrow or closed passages, viscid secretions, bristling hairs, &c. are all effective protections against ants. In the tropics, some species of ants do much damage by stripping off the leaves of plants, but in other cases ants may be of actual service in driving off more destructive species or other insects. The large 'bull's-horn thorns' of certain Central American species of acacia are tenanted by a species of ants (*Pseudomyrma bicolor*), forming 'a most efficient standing army for the plant, which not only prevents the mammalia from browsing on the leaves, but delivers it from the attacks of a more dangerous enemy—the leaf-cutting ants.' Moseley notes that in the case of two plants growing as Epiphytes (q.v.) on trees, a gall-like tumour is always formed at their base by ants, without which the plants cannot thrive.

Intelligence.—The senses of ants are well developed. They are keenly sensitive to slight changes of temperature and light, and can both perceive rays and hear sounds for which our sense-organs are not adapted. Some forms are able to make a rasping noise by means of a structure on the abdomen, and the solitary ant, Mutilla, utters when seized a characteristic note between a buzz and a squeak. The highly developed sense of smell appears to aid them greatly in finding their way, in which, however, they are not, at the best, adepts. They are able to recognise the members of their own community even when these are intoxicated, or removed from the nest as larvæ and brought up separately. Several naturalists have shown that ants are able definitely to communicate with one another 'by something approaching to language.' The habits of ants have long formed a favourite study of naturalists, and the intimacy with which they have been studied is, doubtless to some extent, the reason of their being so often referred to. Their ceaseless industry when there is work to do has become proverbial, while many authorities have also noted an indulgence in 'sportive exercises' or 'play.' One observer, the Rev. W. Farren White, describes the exuberance of delight exhibited by the inmates of a formicarium when placed near the fire. 'They embraced each other, and skipped and danced like playful lambs or kittens.' Careful removal of the dead has also been observed. Their ingenuity in economising labour, e.g. in dropping desired objects from a height to others waiting below—in overcoming obstacles, e.g. by themselves forming living bridges or building more substantial inanimate ones—in the architectural devices exhibited by their manifold

nests, and in many other ways—has become a common subject of deserved admiration, though their marvellous powers are associated with no less striking limitations. In their recognition after separation for months, in their care for the young or disabled, as well as in their persistent enmity to competing species and communities, ants exhibit a considerable range of emotional development.

'When we see an ant-hill tenanted by thousands of industrious inhabitants, excavating chambers, forming tunnels, making roads, guarding their home, gathering food, feeding the young, tending their domestic animals, each one fulfilling its duties industriously and without confusion, it is difficult altogether to deny them the gift of reason,' or avoid admitting 'that their mental powers differ from those of men, not so much in kind as in degree.' There are many authorities, however, who emphasise the routine character of ant-behaviour, their relative lack of plasticity or educability, their independence of previous experience, and so on, and would conclude that their mental powers, being predominantly instinctive rather than intelligent, differ from those of the higher big-brained animals in kind rather than in degree.

See Avebury's *Ants, Bees, and Wasps;* W. M. Wheeler's *Ants: their Structure, Development, and Behaviour* (1910); Auguste Forel's *Social World of Ants* (trans. 1928).

Antacids are drugs used for the purpose of neutralising or diminishing excessive acidity of the digestive system, or of the different excretions. Substances which act upon the former are termed direct, and upon the latter remote, antacids. Many drugs act in both ways, such as potash, soda, lithia, lime, and magnesia, as well as their combinations with carbonic acid. Some substances —as, for instance, ammonia and its carbonate—are only direct antacids, being converted into acids in the body, and thus increasing the acidity of the urine. Others—like the acetates, tartrates, and citrates of the alkalies—are not direct antacids, inasmuch as they are neutral salts, but, being converted into carbonates in their passage through the body, they act as remote antacids, and reduce the acidity of the urine. The direct antacids are required when digestion is followed by the generation of too much acid. When this is confined to the stomach, potash is to be preferred, as being more readily absorbed, or in the case of aged or feeble individuals, ammonia, as being at once a stimulant and an antacid. If the acidity exists in the bowels, soda, lime, or magnesia is to be given, as being less readily absorbed than potash, and more likely, therefore, to reach the situation of the acidity. The remote antacids are required in cases where the condition known as acidosis exists in the blood, and the urine is excessively acid. In such cases bicarbonate and citrate of potash are the antacids usually chosen.

Antæus, in Greek Mythology, a son of Poseidōn and Gē, a huge giant in Libya, who challenged all strangers who came to his country to wrestle with him. No one could throw him, because every time he touched the earth, his mother, he received new strength. Hercules crushed him by lifting him up so that he could not touch the earth.

Antal'cidas, a Spartan politician, son of Leon, chiefly known by the celebrated 'peace of Antalcidas,' otherwise 'the king's peace,' concluded with Persia in 386 B.C. at the close of the Corinthian war, the fruit of his skilful diplomacy and naval operations. By this treaty Cyprus and all the towns on the mainland of Asia Minor passed under Persian sway; the Athenians retained only the islands of Lemnos, Imbros, and Skyros, while all the other Greek cities were declared independent. Spartan influence thus became supreme in Greece, while everything gained by Athens in the Persian wars was lost. Antalcidas was ephor at Sparta in 370–369. After the battle of Leuctra he seems to have lost the favour of Persia. He is said to have starved himself to death on the ill success of another mission, probably in 367. See GREECE.

Antanànarìvo, or TANANARIVE, the capital of Madagascar, has a population of about 71,000. It is situated on a hill, in an undulating district, at an elevation of nearly 5000 feet above sea-level. It is connected by rail (229 miles, opened 1913) and road with Tamatave, the chief seaport. The royal palace occupies the summit of the hill; adjoining are the dwellings of the chief officers of government. There are Anglican and Roman Catholic cathedrals, many other churches, a mosque, government buildings, schools, hospitals, &c. The French occupied the city, 30th September 1895.

Anta'ra, or ANTAR, a celebrated Arab chief in the middle of the 6th century, one of the seven poets whose prize-poems were hung up on the Kàaba, and thence called *Moallakât;* see ARABIAN LANGUAGE.

Antarctica. The Antarctic regions are essentially the antithesis of the Arctic regions. A glance at the north and south polar charts shows that there is a polar basin—the Arctic Ocean—in the north surrounded by continental lands, but that in the south there is a polar continent—Antarctica—surrounded by the great oceans. A further remarkable feature is that if the land forming the continent of Antarctica were uplifted at sea-level, turned upside-down, and immersed in the north polar basin, it would almost exactly fill it up to sea-level. The fact that the great continents of Europe, Asia, and America not only surround but actually help to form part of the Arctic regions, and also that for centuries these continents have been the home of the civilised nations of the world, accounts for the earlier and more extensive exploration of the north polar regions, which have not only been more accessible to these peoples, but have also been wrapped up with their industrial and intellectual activities. The search for a shorter route from the West to the riches of the East first stimulated Arctic exploration, and finally led to the scientific exploration of the Arctic regions. The reverse has been the case in the exploration of the Antarctic regions.

Although the Antarctic continent, to which Sir John Murray, who did so much in his lifetime to stimulate Antarctic research, gave the fitting name of 'Antarctica,' is cut off so completely from other continental land-masses by the widening out of the southern extensions of the Atlantic, Pacific, and Indian Oceans uniting to form the Antarctic or Southern Ocean, yet there is very strong evidence that there was a much greater extension of the Antarctic land-mass even in recent geological times, and that South America, South Africa, Australia, and New Zealand were formerly all united with Antarctica (see ANTARCTIC OCEAN).

Recent expeditions have added much to our knowledge of Antarctica. Antarctica has an area almost equal to Europe and Australia combined. Comparing its area with that of the other continents, we find:

1. Asia	17,250,000	square miles.
2. Africa	11,520,000	" "
3. North America	7,729,000	" "
4. South and Central America	7,128,000	" "
5. Antarctica	5,470,000	" "
6. Europe	3,750,000	" "
7. Australia	2,947,000	" "

The coast-line is approximately 14,000 miles. The continent lies almost entirely within the Antarctic circle, the Graham Land peninsula only pushing

well north of the circle, while there is a deep dip in the coast-line south of New Zealand, where the Ross Barrier almost skirts the 78th parallel of latitude, and another to the south of the South Atlantic Ocean where the Weddell Sea washes the shores of Coats Land and Luitpold Land to almost as high a latitude. Although great stretches of the coast-line of this extensive continent have yet to be explored, namely, between Enderby and Coats Land, Luitpold Land and Graham Land, and Charcot Land westward to Edward Land, yet, on the other hand, no less than 3000 miles are now relatively well known, including part of the coast of Edward Land, and the sea-face of the Ross Barrier, the cliff of which only varies to a relatively slight degree every year, Victoria Land, George Land, Adelie Land, Wilkes Land, Mary Land, with their ice-barriers, and Wilhelm Land; Coats Land and Luitpold Land; and Graham and Charcot Lands. Less-known portions of the coast-line are Enderby Land and the southern coasts of eastern Graham Land, including Föyn Coast. The most extensive and the best-known coast-line stretches continuously for over 2200 miles from well south of the Ross Barrier to Wilkes Land. Victoria Land has been more thoroughly explored by many expeditions because the Ross Sea offers the easiest approach to the Antarctic continent. The Ross Barrier being almost entirely afloat, its seaward ice-cliff, therefore, technically cannot be considered as coast. These expeditions have chosen this easier passage rather than meet rebuffs in regions like the Weddell Sea and the ice-congested seas between Graham Land and Edward Land.

The coast-line of Adelie Land, Wilkes Land, and lands adjacent are also difficult of access on account of heavy pack, great glacier ice-tongues, and bad weather. Similarly the supposed coast-line between Graham Land and Edward Land has been shut out from the researches of eager and capable explorers on account of great difficulties of navigation—witness the drift of the *Belgica* and the voyage of the *Pourquoi-pas?* The interior of Antarctica has been chiefly revealed to us by the researches of Scott, Armitage, Shackleton, David, Mawson, Wild, and Amundsen.

Murray always emphasised that there was one main continental mass, and this view has more recently been supported and emphasised by Bruce, Mossman, Rudmose Brown, and others. The extraordinary view of Sir Clements Markham in 1904 that there was a strait joining the Weddell and Ross Seas was even at that time against all evidence, especially in view of Bruce's discovery of Coats Land and the meteorological researches of Mossman. The remarkable circumstance is that this extravagant theory has since 1904 been supported by such authorities as the late Sir George Darwin, Penck, Mawson, and Griffith Taylor. The seiche theory of Darwin has clearly been nullified by the journeys of Shackleton, Scott, and Amundsen; Penck's meteorological reasons do not agree with the more complete meteorological conclusions evolved; the geological evidence on which Mawson and Griffith Taylor rely, though more weighty than any other, is insufficient to support the theory of a strait or belt of low-lying ice stretching across from the Weddell to the Ross Sea. The aim of these geologists has been to differentiate between the folded mountain system of Graham Land and the plateau formations of Victoria Land, but it is by no means necessary to have a trough between the systems in spite of a downthrow along the east coast of Victoria Land in the region of the Ross Sea and Barrier. For the elucidation of actual conditions further expeditions are required in order to explore east Graham Land, with journeys west and south into the interior, and in order to explore Edward Land, with journeys east and south into the interior, as well as a serious attempt to demarcate the continental coast between Charcot and Edward Land and penetrate into the interior at different points along that coast-line. These explorations promise to be as difficult and dangerous as any yet undertaken in Antarctic regions, and it is not worth while attempting them without strong, powerful, and thoroughly equipped vessels directed by experienced ice-pilots and trained oceanographers and with effectively equipped land-parties led by geologists and surveyors.

The general features of Antarctica and its covering of ice and snow depend on the geological constitution of the continent. It seems most likely that Antarctica consists of one great continental land-mass, with the mighty Victoria-Graham mountain-range with an overlapping or break somewhere on the Pacific side of the South Pole. It is not unlikely that the Victoria Land mountain-range pushes across to the Weddell Sea, while the Graham Land range runs parallel and close to it in western longitudes over towards Edward Land. This theory does not, however, necessitate the idea of a 'gutter' at sea-level between the two opposed Atlantic and Pacific mountain systems.

To sum up, Antarctica is probably one great land-mass having an approximate area of 5,500,000 square miles, with a Pacific-Atlantic mountain backbone, continuous but changing in structure, rising to a maximum height of 15,500 feet. The average height of the Antarctic continent has been estimated at from 2500 to 4000 feet by Simpson and others. The land drops abruptly towards the sea in western longitudes, and forms a coast more or less continuously flanked by lofty mountains, with here and there glaciers or ice-barriers pushing far out to sea. On the Indian Ocean and Atlantic side the land slopes gently in long stretches from this mountain-range, and is more or less completely covered by an ice-sheet which near the South Pole has a height of 9800 feet, with only occasional rock-masses like those of Adelie Land, Wilkes Land, Gaussberg, Enderby Land, and Luitpold Land, &c. These break the monotony of almost continuous undulating ice-sheets overlying the land, and quietly descending towards the Atlantic and Indian Oceans, terminating in the sea by ice-walls or tapering tongues of ice.

The discovery of Archeocythanidæ in the Weddell Sea by Bruce is an indication that Cambrian rocks not only occur in the vicinity of the Beardmore Glacier, where they were discovered by David and Priestley, but stretch across the continent to Coats Land and east Graham Land or to both. Otherwise little is known of the geological structure of the continent south of the Atlantic Ocean except in Graham Land. On the coast of Graham Land the discoveries of Nordenskjöld have demonstrated an Atlantic type of coast-line comparable in origin and structure with that of southern Patagonia. Belgian and French explorations have shown the west coast of Graham Land to be of the Pacific type, and the same is probably true of Edward Land, whose granite structure may well represent the worn-down stump of a folded mountain-range. It is practically only of Victoria Land and of Graham Land that we have detailed geological knowledge, although Amundsen's expedition made some observations on the geology of Edward Land, and Mawson carefully examined much of Wilkes Land and George Land. The mountains of Victoria Land show a faulted plateau structure which apparently continues south-westward in the Commonwealth and the Maud Ranges. Probably it will also be found in Luitpold Land and Coats Land, but as yet we know nothing of the structure

of these two lands. Elevated but almost horizontal strata of Devonian and Cambrian age are exposed in the mountains of Victoria Land, associated with a certain number of volcanoes along the major fault line. Possibly the eastern side of the Ross Sea is of the same nature, and the sea itself lies in a basin depressed by faulting, whose southern part, covered by sea and land ice and by superincumbent snow, forms the Ross Ice-Barrier. Wilkes Land—to use a general term—is of the same structure as Victoria Land, and so probably is Wilhelm Land, although the only part of that known is the extinct volcano of Gaussberg. East of the folded ranges of Graham Land—the counterpart of the cordilleras of southern South America—occur several extinct volcanoes. But Mount Erebus on Ross Island, off Victoria Land, in 77½° S., is the only known active volcano in Antarctica.

Except on the coastal rocks, where a few mosses, lichens, and algæ are to be found, and where in summer there are numerous bird rookeries, the continent of Antarctica is entirely devoid of life. There are no land animals. See POLAR EXPLORATION.

Antarctic Ocean. It is not satisfactory to confine the Antarctic Ocean to the seas south of the Antarctic Circle. A more satisfactory definition is that the Antarctic Ocean includes those seas that are bounded to the north by the average limit of floating ice.

This boundary may be said to coincide roughly with the 50th degree of southern latitude, but it bends southward to 57° S. in the vicinity of Cape Horn, north of 40° S. in the South Atlantic Ocean, north of 50° S. between the longitudes of Kerguelen and Tasmania, and south of 50° S. between the longitudes of Tasmania and New Zealand (see *Admiralty South Polar Ice Chart*). This great stretch of ocean is formed by the southern extensions of the Atlantic, Indian, and Pacific Oceans, and is known as the Antarctic Ocean, or Southern Ocean. It washes the shores of Antarctica, and stretches almost to 78° S. in the Ross and Weddell Seas, and includes in its area a number of islands lying far from neighbouring continental lands. The Antarctic Ocean is separated into seas which have been given names by recent explorers. Besides the older names of Ross and Weddell Seas, we have Biscoe Sea, Davis Sea, D'Urville Sea, and Bellingshausen Sea. Chun, Gerlache, Bruce, Drygalski, Filchner, Mawson, and Davis have done much during recent years to elucidate the conformation of the floor of this ocean; while Ross, and later Nares and Wyville Thomson with the *Challenger*, initiated this bathymetrical survey. The work of the *Scotia* is the most noteworthy both in the extent of its bathymetrical surveys and especially their relationship to the position of the coast-line of the Antarctic continent—viz. Coats Land in the Weddell Sea—and in the discovery, where water of over 3000 fathoms was previously supposed to exist, of important 'rises' which are believed to indicate former land bridges uniting Antarctica with South America and South Africa. The discovery of the 'Scotia Rise,' as a continuation of the Mid-Atlantic Rise, extending for 1000 miles to the south of Gough Island, was most significant, as well as that 'rise' connecting Graham Land, South Shetlands, South Orkneys, South Sandwich Group, South Georgia, and Falkland Islands with South America. The result of the work of all these deep-sea researches is a very complete mapping of the floor of the Antarctic Ocean, so that not only the depths but also the nature of the bottom is now moderately well known. The coast-line of Antarctica is surrounded by a belt of blue or glacial mud, to the north of which lies another belt of diatom ooze which in places stretches beyond the limits of the Antarctic Ocean as above defined. This northern limit of the diatom ooze belt abuts against an extensive deposit of globigerina ooze which stretches far beyond the northern limits of the Antarctic Ocean.

The physics of these seas is as yet little worked out, although many important observations of temperature, salinity, specific gravity, tides, currents, &c. have recently been collected; but the discussion of these observations is yet to be undertaken. It is interesting to note, however, that as in Arctic seas, so also in Antarctic waters, the well-known phenomenon of an intermediate warm layer of water at about 100 fathoms is to be found, appearing to indicate a warm but more saline wedge of water pushing south and sinking beneath the colder, but by virtue of its less saline nature relatively lighter, water overriding this warmer layer. Water of very low temperature appears to flow out of the Antarctic Ocean, appearing as cold bottom water in lower latitudes. More or less north, in the latitude of 65° S., there is a continuous easterly surface drift, mainly due to westerly winds, throughout this belt of the Antarctic Ocean, but south of this latitude this surface drift ceases to exist, and a complicated series of drifts, mainly due to the direction of wind, comes into force. These drifts are generally known in the Bellingshausen and Weddell Seas. The drift of the *Belgica* contributed towards the elucidation of the surface drift in the Bellingshausen Sea. There the permanent easterly drift almost reaches the seventieth degree of latitude, while south of 70° S. the *Belgica* drove mainly towards the west with a westerly drift. But the drift varied from month to month, and the direction of the drift in the same locality at different times greatly varied. In the Weddell Sea the researches of the *Scotia* determined that the easterly drift extended to about as far south as the sixty-fifth degree of latitude, and that in approximately that latitude it began to drive to the westward. The region of change of drift is marked by the presence of a large number of icebergs. The westerly drift appears to drive from east to west along the coast of Coats Land, thereafter to be turned into a northerly drift along the east coast of Graham Land, turning east again north of the sixty-fifth degree of latitude. The drift of the *Deutschland* and *Endurance* has confirmed these observations of the *Scotia*. The nature and distribution of ice in Antarctic seas is important in relation to navigation, as bergs of great size may be found as far north as the northern limits of the Antarctic Ocean as above defined. Besides bergs there is the ordinary sea ice, concerning both of which reference should be made to Bruce's *Polar Exploration*. The icebergs are of enormous size and of tabular formation, in contrast to the more irregular-shaped and small icebergs of Arctic seas. Relatively few irregular bergs are found in Antarctic seas. The tabular bergs are of enormous size, frequently three or four miles in length, and occasionally even thirty to forty miles or even more. These are calved off great barriers, such as the Ross Barrier, and the ice-tongues discovered by Mawson and Davis off the coast of Adelie and Wilkes Lands. The distribution of pack-ice and bergs, especially pack-ice, is dependent mainly on winds and surface drift, and results generally in heavy pack hugging almost every part of the Antarctic coast-line, the only exception being the comparatively ice-free coasts of the Ross Sea, no ship having ever yet been stopped from reaching M'Murdo Sound and the Ross Barrier. West of Cape Adare, especially west of Adelie Land, no vessel has yet been able to penetrate to the coast except in the vicinity of Termination Barrier and Cape Ann, and in the

Weddell Sea, where, although Weddell and Morrell were exceptionally fortunate in 1823, Ross in 1843 was beset like Bruce in 1903 and 1904, Filchner in 1912, and Shackleton in 1915. Only Filchner reached the land, to be beset and frozen in the drifting pack for the whole winter like Shackleton, whose ship was crushed. Similarly, in the Bellingshausen Sea De Gerlache was beset, and drifted a whole year out of sight of the coast; and Charcot also was unable to penetrate into the coast west of Graham Land.

Much has been added to the biology of Antarctic seas by the researches especially of the *Belgica*, *Scotia*, *Discovery*, *Gauss*, *Terra Nova*, *Française*, *Pourquoi-pas?* and *Aurora*, and reference should be made to the scientific reports of these expeditions. The researches of the *Scotia* added more than any other expedition to our knowledge of the deep-sea fauna of Antarctic seas. Antarctic seas are very rich in diatoms and other algæ, which often colour the water olive-green or brown, and quickly fill up tow-nets with a gelatinous mass. These diatoms form the basis of much pelagic and deep-sea animal life, and, sinking to the bottom, account for the great circumpolar belt of diatom ooze—the position of which does not, however, coincide with the surface distribution of the diatoms, and indicates undercurrents to the north. Birds — especially penguins and petrels — seals, and whales are in turn supported by this vast amount of animal life in the sea, so that as soon as the ice breaks up with the advance of spring and summer they find their way south—the birds to rocky terraces and cliffs bordering this rich sea, where they can find a plentiful supply of food for themselves and their young, and the seals to the ice-pack, where they bring forth and nourish their young, and mate again for the next season. Whales abound in these waters so plentifully that during summer months in Antarctic waters south of the Atlantic Ocean alone produce to considerably over a million sterling is taken. Except in the case of whales, owing to their apparently extensive migratory habits, and in the case of two or three birds for the same reason, the theory of bipolarity seems to break down before modern biological research in Antarctic seas; and indeed, although many forms appear to be circumpolar in distribution, others appear to be distinctly confined to definite areas. Generally speaking, the fauna of the Weddell Sea, for instance, appears to be different from that of the Bellingshausen Sea and of the Ross Sea. See POLAR EXPLORATION.

Ant-bear, the great ant-eater (see ANT-EATER); also the Aard-vark (q.v.).

Ant-eaters (*Myrmecophagidæ*), a family of South American mammals belonging to the insect-eating division of the order Edentata. The absence of teeth, the long head, tubular mouth, worm-like tongue, the marked development of the third digit of the fore-foot, and the insect diet, are prominent characteristics of this small family. (1) The largest form is the Great Ant-eater (*Myrmecophaga jubata*), or Ant-bear, as it is called in Demerara, which inhabits swampy regions in South and Central America. It measures 4 feet in length, not including the bushy tail, which is sometimes as long as the body. The long coarse hair is of a dark-gray colour, and a black band extends from the chest across the shoulder backwards. The skull is prolonged into a narrow snout. The ears and eyes are very small. The long worm-like tongue may be protruded to a length of 18 inches from the tubular mouth at the end of the muzzle, and is covered with a viscid secretion from large glands which extend back over the chest. By this means, the very abundant termites or white ants are caught in great numbers as they issue from the invaded nest, and whipped with extraordinary rapidity into the mouth.

Great Ant-eater (*Myrmecophaga jubata*).

The internal opening of the nose is unusually far back in the mouth, as in crocodiles and whales. The posterior portion of the stomach forms a muscular gizzard in adaptation to the nature of the food. The third digit of the fore-foot is much larger than the three others, and bears a very powerful claw, which is used in breaking into the termite nests. In walking, the fore-toes are much bent, the pointed tips are protected by being turned inwards and upwards, and the animals thus rest their weight in a sort of club-footed fashion on the outer portions of the outer toes. The five toes of the hind-foot are almost equal, and bear strong claws; the broad sole rests on the ground. This form is wholly terrestrial, and has the reputation of being slothful, unsocial, and stupid. Like other insectivorous animals, it can live for prolonged periods without food. It spends much of its time in sleep, the long snout concealed in the fur of the breast, the hind and fore claws locked together, and the bushy tail thrown over all, as if for a shade from the sun. Though the collar-bones are rudimentary, the Great Ant-eater has great strength in its fore-legs, and is said to hug like the bear, so as to crush its enemy to death. The female bears but one at a birth, and carries it about on her back during its slow growth. The flesh is eaten by the Indians and negroes. Another much smaller form, the Tamandua (*T. tetradactyla*), is arboreal. The head is shorter, and the somewhat prehensile tail is scaly below and at the end. The Little Two-toed Ant-eater (*Cyclosurus didactyla*) is also arboreal. The skull is still shorter, the fur is softer, the feet adapted for climbing, the collar-bones well developed, and the tapering tail thoroughly prehensile.—(2) The Pangolins (q.v.), or Scaly Ant-eaters of the Old World, though closely related, belong to a different family, and are discussed elsewhere. —The name Ant-eater is given at the Cape of Good Hope to the *Orycteropus capensis*, the Aard-vark (q.v.) or Earth-hog of the Dutch colonists, a quadruped of about the same size as the great ant-eater of America, and belonging to the same natural order.—(3) The *Echidnæ* of Australia are sometimes called Porcupine Ant-eaters; but though they agree with the above in the nature of their food, and in the sharp snout and protrusible tongue, their general structure is quite different. See ECHIDNA. (4) The *Myrmecobius fasciatus*, a small marsupial of Australia, is also called ant-eater.

Antecedent, a term in Logic, Grammar, and Mathematics. In Logic, it is a statement or proposition from which another is logically deduced. In Grammar, it is the substantive (word or clause) to which a relative points back. In Mathematics, we speak of the antecedent of a ratio—i.e. the first of two terms which compose the ratio; the first and third in a series of four proportionals.

Antediluvian (Lat. *ante*, 'before,' *diluvium*, 'the deluge') is the word used of anything that existed before the flood, in the patriarchal ages between Adam and Noah. The word is often employed in modern usage for anything antiquated or primitive, in a somewhat disparaging sense.

Antelopes (*Antilopidæ*), a family of Mammalia belonging to the order of Ruminants (q.v.), and to the hollow-horned section of that order—in which the horns consist of a horny sheath, surrounding a bony process of the skull, and are permanent, not annually renewed. In antelopes, however, the bony centre of the horns is solid and not occupied, as in those of goats, sheep, and oxen, to a considerable extent, with cells communicating with the frontal sinuses. They differ externally from goats in their beardless chin, and from them and sheep in the absence of longitudinal angles or ridges on the horns, which are, however, very generally marked with cross rings. The body is slender and deer-like, the feet small and elegant, the tail short and tufted, the hair generally short, and the colour often lively. Some species, however, have comparatively long hair; and a few which inhabit cold mountainous regions are clothed with wool mixed with longer and coarser hair, as in the Chamois (q.v.) of the Alps, Caucasus, &c.; the Rocky Mountain Goat (q.v.) of North America; and the Chiru of the Himalayas. Many species have *tear-pits* below the eyes, as in Deer (q.v.). The females of many species, as of deer, are destitute of horns; and if they alone came under observation, it would be difficult to say to which genus they belonged. The size is very various; the Guevi, or Pigmy Antelope of Africa (*Antilope pygmæa*), is only 8 to 9 inches high at the shoulders, whilst the largest forms measure 5 or 6 feet. Almost all the species of antelopes are peaceable, timid animals, and are distinguished by agility and fleetness. Most of them are gregarious. Some inhabit plains; others are found only in the most inaccessible mountainous regions; whilst others dwell in jungles and deep forests. Many, on the other hand, are water-loving forms, and frequent the banks of rivers. North America possesses two species, found only in the western parts of the continent, the Prong-horn (*Antilocapra*) and the Rocky Mountain Goat (*Aplocerus*), which depart considerably from the typical character of the family. It has been proposed to introduce the latter as a wool-bearing animal into the Highlands of Scotland. The Prong-horn sheds the horns annually like most species of deer. Europe produces only the Alpine Chamois and the Saiga (*A. saiga*), which inhabits the southern plains of Poland and Russia. Asia has about fifteen species; but the vast majority are found in Africa, and particularly in South Africa. The very numerous forms are arranged in sections or groups according to the peculiarities of the horns and other characters, but a satisfactory classification is difficult. The flesh of most antelopes is used for food, and they are therefore much hunted. In Africa some of the species exist in great numbers, and when severe drought occurs in the regions which they ordinarily inhabit, dense and multitudinous herds occasionally appear in the interior of the Cape of Good Hope, to the terrible devastation of the crops. Even the saigas of the Tatarian plains congregate in herds of many thousands in the end of autumn.

The name antelope is sometimes more particularly applied to a species also known as the Common or Indian Antelope, and as the Sasin. It is a native of India and the eastern parts of Asia, and is a beautiful animal about 2½ feet high at the shoulder, with erect, diverging horns, bent in a spiral of two or three turns. The hair is uniformly short, except that, as in many other species of antelopes, there are small tufts of bristles on the knees. It inhabits open plains, and the herds exercise great watchfulness. Its fleetness is such that greyhounds chase it in vain; and it can easily bound over an inclosure of 11 feet in height, or over a distance of 10 or 12 yards. The flesh is held in small esteem, and the animal is less than many of its congeners an object of the chase.—The Saiga is a much less graceful animal, with short, somewhat lyre-shaped horns in the males only. These are used by the Russians and Chinese for the manufacture of many articles of domestic economy; and it is chiefly for their sake and that of the skin that the saiga is hunted, the flesh having a disagreeable taste, which is ascribed to the saline and aromatic plants of the steppes.—The Dzeren (*A. gutturosa*), sometimes called the Chinese Antelope, and known among the Chinese by a name which signifies the Yellow Goat, is an inhabitant of the arid deserts of Central Asia. The flesh is highly esteemed. It derives its specific name from a large movable goitre-like protuberance on the throat of the old males, produced by a dilatation of the larynx.—The Addax or Nubian Antelope (*A. addax*), which was known to the ancients, and is

Addax (*Antilope addax*).

mentioned by Pliny, has horns very similar to those of the Indian Antelope, but is a larger animal, less graceful, with a slight mane on the neck, a tuft of long hair on the forehead, and large broad hoofs, adapted for treading on fine and loose sands. It inhabits the deserts of Central Africa, and, contrary to the usual habits of the genus, is said not to be gregarious, but to live in pairs. The Chikara and some other Indian species are distinguished by two additional rudimentary horns in front of the ordinary horns, and immediately over the orbits. The chikara inhabits thick forests and jungles. Like the addax, it lives in pairs; as do also the Stein-bok of South Africa, an extremely graceful species, and the Kleene-bok of the same country (*A. perpusilla*), a beautiful and active little creature with very small horns. The kleene-bok is of a mild and gentle disposition, and extremely capable of domestication. The Gazelle (q.v.) of North Africa (*A. dorcas*), one of the species known to the ancients, is very frequently domesticated; and from its gracefulness of form, its gentleness of manners, and its bright black eyes, has afforded to the Arabian poets one of their most favourite objects of comparison. The South African Spring-bok (q.v.) is another very beautiful species, and is frequently domesticated by the colonists at the Cape of Good Hope. Among the numerous species which that country produced

Head of *Antilope chikara*.

may be mentioned also the Blauw-bok (*A. leucophæus*), now extinct; a survivor is the Kaffrarian Oryx (q.v.). Still more worthy of notice among the South African species, but in some measure departing from the strict antelope type, is the Eland (q.v.), the largest of all the antelopes—an animal which may probably be found valuable in domestication. The Koodoo is another noble species allied to the eland. The Nyl-ghau (q.v.) of India and the Gnu (q.v.) of South Africa are also among the largest antelopes, but depart still further from the generic type. Less different from the ordinary type, but still with a marked approach to a bovine appearance, are the Bubalis of the ancients, frequenting the north of Africa, and the nearly allied Kaama or Harte-beest of the Cape of Good Hope. The flesh, skin, and horns of the antelopes have been widely utilised from early times. Antelopes may be grouped according to habitat, as desert, bush, rock, and plain forms. The Indian antelope is sacred, and the exaggerated development of a single horn in a Chinese antelope may have favoured the unicorn myth. See *The Book of Antelopes*, by Sclater and Thomas (4 vols. 1894–1901).

Antennæ, or feelers, the anterior appendages on the head of crustaceans, insects, and myriapods. The typical crustacean, such as a lobster, has two pairs of feelers, while insects and myriapods have only one pair. The name may also be applied to sensory processes on the head of some marine worms. They are really 'head-legs' modified for sensory purposes, and consist of a long series of joints, sometimes over 100 in number. They are supplied with nerve branches, and are used by the animals for feeling their way, for testing surrounding objects, and apparently for communicating with one

Various forms of Antennæ. (From Roget.)

another. Professor Graber has demonstrated the olfactory function of the antennæ of the cockroach, but some insects can smell their food even when robbed of their feelers. The smelling bristles of insects have been carefully studied by Braxton Hicks and Lowne in the case of the blowfly, where they occur very abundantly on the third joint of the antennæ. Peculiar sensory cones and knobs occur on the antennæ of some myriapods. The small antennæ of the lobster bear olfactory bristles, and have an ear lodged at the base. And in short there are numerous observations to justify the general statement that in many cases the antennæ are sensitive to smell, sound, and probably taste. Deprived of its antennæ, an ant, for instance, is peculiarly helpless.

Antequ'era (the *Antiquaria* of the Romans), an important town in the Spanish province of Malaga, in a fertile plain on the left bank of the Guadalhorce, 65 miles W. of Granada by rail. Held by the Moors from 712 to 1410, it retains some portions of a commanding Moorish castle and of the ancient walls. It has a trade in oil and fruit, and some manufactures of woollens, silks, leather, and soap. Pop. 28,000.

Anthe'lia (Gr. *anti*, 'opposite,' and *hēlios*, 'the sun'), or GLORIES, are luminous rings seen by an observer on a cloud or fog which lies opposite to the sun. They occur chiefly in alpine regions and in the polar seas, and are only seen when sunshine and cloud, or fog, occur at the same time. They appear in the following way: When, from an elevated position—as the mast of a ship, or the ridge of a hill—the shadow of an observer is projected by the sun on a cloud or fog, he sees the head encircled by a glory or luminous ring, diminishing in brightness as it leaves the head as a centre. When the sun shines brightly, and the fog is dense, as many as four concentric rings of this nature are seen by the observer round the shadow of his head, having their common centre in the point where a line from the sun through the eye of the observer meets the fog. When the phenomenon assumes this form, the rings are more or less coloured—the colours of the two inner rings being generally brilliant, those of the third more faint, while those of the fourth are scarcely perceptible. This last has an angular radius of about 40°, and is very seldom seen. It bears frequently the name of the Circle of Ulloa or the White Rainbow. A phenomenon substantially similar to the anthelia occurs when, the sun being near the horizon, the observer sees an aureola surrounding the shadow of his head cast upon grass or corn moistened with dew. See HALOS, DIFFRACTION, LIGHT, RAINBOW, REFRACTION.

Anthelmintics. See VERMIFUGES.

Anthem, a shortened form of ANTIPHON (Gr. *anti*, 'in return,' *phōnē*, 'voice;' a piece sung in alternate parts), a species of musical composition introduced into the service of the English Church in the reign of Elizabeth, and appointed to be sung daily, at morning and evening service, after the third collect. The words of the anthem are taken from the Psalms, or other suitable parts of the Scriptures, and the music is either for solo, soli, or chorus, or a mixture of all three. In its origin, musical construction, and use it is similar to the motett of the Catholic Church, which name has been retained by the Lutheran Church. The word is also loosely used, in such phrases as 'the National Anthem,' for what is rather a hymn. See ANTIPHONY, HYMN, MOTETT, NATIONAL HYMNS, SERVICE (MUSICAL).

Anthemis. See CAMOMILE.

Anther. See STAMEN.

Antheridium, the male reproductive organs of many cryptogams (Ferns, Horsetails, Mosses, &c., q.v.). They may consist of a single cell, but are usually multicellular sacs, within which the thread-like male reproductive elements or antherozoids are produced. These are liberated by the rupture of the antheridium wall, and the antherozoid is enabled, by means of the lashing movement of its cilia, to reach and descend the tubular passage of the archegonium to the female cell, which it is its function to fertilise. See ALGÆ, FERN.

Anthol'ogy, from a Greek word meaning literally 'a collection of flowers,' is a title given to a work consisting of a series of choice thoughts, generally used solely of collections of poems. By far the most important is the Greek anthology, though the Latin anthology is also famous.

Greek Anthology.—The first Greek anthology deserving the name was compiled by Meleager of Gadara, in Syria, about 60 B.C. He called it a 'Garland' (*Stephanos*), and included in it poems by himself and forty-six earlier poets—Archilochus, Alcæus, Anacreon, Simonides, Sappho, and others. This collection was added to by four successive editors, and in the 10th century Constantine Cephalas made a new collection, containing the best in the earlier ones, with some additions. Maximus Planudes, in the 14th century, by his tasteless selection from the work of Cephalas, rather spoiled than increased the already existing store; but his excerpt was the only anthology known in the West until the 17th century. It was printed at Florence by Lascaris in 1494 and frequently re-edited, and translated by Grotius. Meanwhile, Salmasius had discovered in the Heidelberg Library (1606) the only extant manuscript of the older and richer anthology of Cephalas, and copied it. The Heidelberg MS. was subsequently carried to Rome and Paris, returning to its old home in 1816. The anthology, as Salmasius copied it, was not published till it was included by Brunck in *Analecta* (1772–76); and this was superseded by the standard *Anthologia Græca* of F. Jacobs (13 vols. 1794–1803; improved in 1813–17). The edition in Didot's *Bibliotheca* (1864–72) is admirable. Good selections from the anthology are those of Weichert, Jacobs, and Meineke.

The Greek anthology contains specimens of 300 Greek poets at all periods of Greek civilisation—the old Hellenic, Alexandrian, and Byzantine, heathen and Christian—and is invaluable as a reflection of Greek thought, mainly in its most human side, illustrating, with a fullness not elsewhere found, domestic life and private feeling. Love songs, witty verses, and devout sentiment are found there side by side; the terse, pithy, dignified poem suitable for inscription (epigram in the old sense; see EPIGRAM) of the ancient time is followed by the florid, ornate writings of the later period. Nowhere is there to be found a richer variety of poetic life, greater delicacy of sentiment, a more joyous serenity, a greater abundance of wise, true, and humane thoughts, than sparkle in the pages of the Greek anthology. There are English translations of selections by Wrangham, John Sterling, Merivale, Macgregor, and Garnett. See the little work on the anthology by Lord Neaves; Symond's *Studies of the Greek Poets;* Butler's *Amaranth and Asphodel;* Mackail's *Select Epigrams from the Greek Anthology* (new ed. 1906).

Latin Anthology.—The ancient Romans had no proper anthologies. In 1573, Scaliger published at Leyden, in imitation of the Greek anthology, a Latin anthology, under the title *Catalecta Veterum Poëtarum*, and Pitthöus one at Paris in 1590. A larger *Anthologia* was issued at Amsterdam (1759 and 1773) by Peter Burmann the Younger, a better arranged edition of which was published by Meyer in 1835. The first critical Latin anthology was that of Riese (1869–70), containing 942 poems of very various merit. There is one by Tyrrell (1901) and one in the 'Golden Treasury Series' (1909).

Asiatic literature is extremely rich in anthologies, which consist sometimes of extracts from the best poets, arranged according to the subject, and sometimes of 'beauties' of their best poets, with biographical notices, which are either placed in chronological order, or according to the countries in which the authors lived. The Arabic, Persian, and Turkish literatures are rich in anthologies; there are also Tatar, Indian, and Chinese collections of a similar kind.

The Golden Treasury of the Best Songs and Lyrical Poems in the English Language (1861), by F. T. Palgrave, is a brief English anthology (2d series, 1897). It has had many successors, among which those of Sir A. Quiller-Couch are notable. A larger selection is the *English Poets*, edited by T. H. Ward (4 vols. 1880; vol. v. 1918).

Anthon, CHARLES, LL.D., a well-known editor of classics, was born in New York in 1797. Educated at Columbia College, he was admitted to the bar in 1819; but next year was appointed adjunct-professor of Languages in Columbia College. In 1830 appeared his large edition of Horace. Five years later he became head of the classical department at Columbia College. A student of the most methodical habits, he was able to produce about fifty books, chiefly editions of the Latin classics and aids to classical study. His editions for a time were widely popular, even in England; more, however, from their superabundant explanations, with lazy schoolboys than with careful teachers. He died July 29, 1867.

Anthony, ST. See ANTONY, ST.

Anthozoa, one of the three classes of Cœlenterates, including sea-anemones, dead-men's fingers, corals, &c.; now usually called Actinozoa (q.v.).

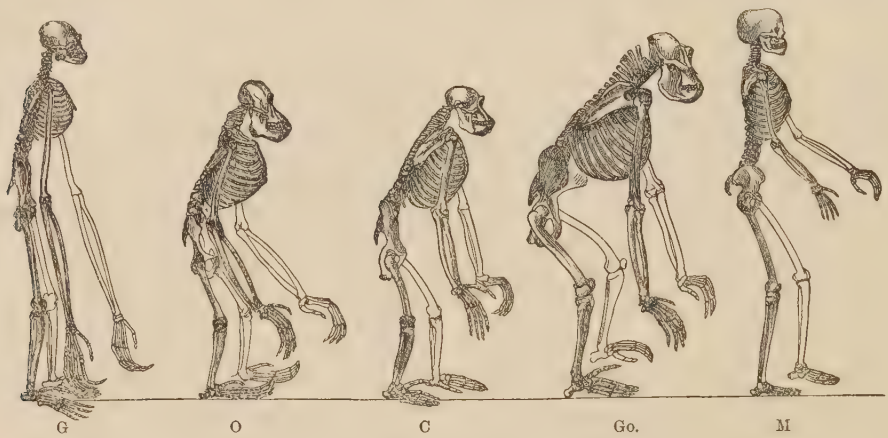
Anthracene, obtained in the distillation of coal-tar, is the source of artificial Alizarin (q.v.).

Anthracite or Stone Coal is black, has a kind of iridescent or metallic lustre, is not readily ignited, and burns nearly without smell, smoke, or flame (hence sometimes called *blind-coal*), giving out an intense heat. Consisting almost entirely of carbon, and containing only a small proportion of volatile matter, it is a kind of natural coke, and is employed in the burning of lime and bricks, the reduction of iron, &c.

Anthrax, a destructive disease of sheep and cattle, horses and camels, is also known as Splenic Apoplexy or Splenic Fever, and in man as Malignant Pustule or Wool-sorter's Disease. In the most acute cases the animal falls as if it had received a severe blow, and goes into convulsions; the pulse is quickened, and the breathing becomes rapid and laboured, and death follows in a few minutes or hours. In less acute cases a fatal termination usually occurs within two days. Anthrax does not readily attack man, and is very rarely communicated by one human being to another. It occurs in those whose occupations bring them into contact with diseased animals and their hides or wool, such as butchers, farriers, and porters. In Britain the source of infection is generally imported wool or hides. Two distinct forms are met with: Internal Anthrax, or Wool-sorter's Disease, in which the spores are probably inhaled, and enter the blood from the respiratory organs—cases are rare, and death usually occurs between the third and seventh day; External Anthrax or Malignant Pustule, in which the bacilli are introduced through an abrasion or wound of the skin. Energetic treatment by excision or cauterisation may save the patient from a probably fatal issue. In 1881 Pasteur announced that by cultivating the bacillus causing the malady he was able to obtain a form which produced in sheep and cattle inoculated with it a modified anthrax much less virulent and fatal than the ordinary disease, and that the animals thus treated were proof against the ordinary anthrax poison. Pasteur's method is largely employed on the Continent, frequently, though not always, with success. By Sclavo's serum treatment in Italy the mortality in cases of anthrax in men was in 1900–4 reduced from 25 to 4 per cent.; in Britain it remained at 25. Klein found that the blood of white mice killed by anthrax produces a mild protective attack in sheep. Among other difficulties in the way of accurate results is the very different sus-

ceptibility to the disease even of different breeds of the same species of animal; one breed of sheep may be killed by a virus which produces a mild protective attack in another. At best, moreover, the immunity conferred by inoculation seems not to last more than a year.

Anthropoid Apes, the highest and most man-like monkeys, including Gorilla, Chimpanzee, Orang-utan, Gibbon, and several other species. They are technically described by the Linnæan title Anthropomorpha, and readily distinguished, as tail-less, semi-erect, and long-armed, from the dog-like apes (Cynomorpha), which have also a narrow partition between the nostrils (Catarrhini), and also inhabit the Old World. With the decidedly lower flat-nosed New-World monkeys, or Platyrrhini, there is no possibility of confusion. The anthropoid apes are all arboreal, and inhabit Africa, South-eastern Asia, and the Malay Archipelago. In all, about a dozen species have been described with more or less definiteness. The family is of special interest and importance in connection with the views held by evolutionists as to the descent of man. It is recognised by anatomists that all the attempts to establish a fundamental distinction, on anatomical grounds, between the physical structure of the higher apes and that of man are futile. Generic differences, indeed, there are in abundance, but these establish only a difference of degree, and not of kind. Thus, in man, the great toe is not opposable to the others for grasping purposes, the angle between the face and the top of the skull does not exceed 120°, the teeth form an uninterrupted series, and so on; while the strong spines on the back of the gorilla's neck, the very marked eyebrow ridges in gorilla and chimpanzee, the especially long arms of the gibbon, and the protruding jaws of all the anthropoids, are equally characteristic adaptations to different ways of life. Even in the minutiæ of blood-vessels, muscles, nerves, and brain-convolutions, impartial observers have demonstrated the closest resemblance. The differences of structure between the lowest monkeys and the higher are far greater than those between man and any anthropoid ape, the resemblances being especially obvious when young forms are compared. In their expressions of cerebral activity, whether intellectual or emotional, the anthropoids come in some respects very near the lowest human tribes.



Skeletons of Anthropoid Apes compared with that of Man:
G, gibbon (for distinctness, given about twice the proportional size); O, orang-utan; C, chimpanzee; Go., gorilla; M, man. (After Huxley.)

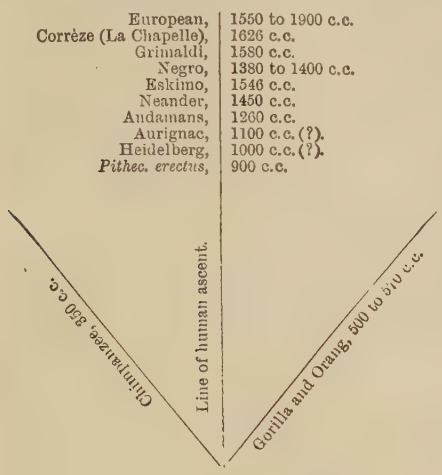
On the other hand, while it is impossible to establish any fundamental distinction in physical structure between Homo and the Anthropomorpha, there is among evolutionists an equal consensus of opinion as to the impossibility of regarding an ape of any existing anthropoid species as in the direct line of human ancestry. As regards brain-structure, the most man-like ape is the orang, while the chimpanzee has the most closely related skull, the gorilla the most human feet and hands, the gibbon the most similar chest. The study of anthropoid fossils has not yet discovered the remains of any form which can be accepted as the 'missing link,' although extinct anthropoids, such as Pithecanthropus (q.v.), serve greatly to lessen the distance to be bridged over. The reader should consult Darwin's *Descent of Man*, Hæckel's *Anthropogeny*, Huxley's *Man's Place in Nature*, and Hartmann's *Anthropoid Apes* (Internat. Sc. Series), where abundant references will be found. See also EVOLUTION, MAN (*Descent of*); and APE, CHIMPANZEE, GIBBON, GORILLA, MONKEYS, ORANG.

Anthropol'atry, the worship of man, the giving of divine honours to a human being. The early Christians accused the heathen generally of anthropolatry, and opposing Christian sects were not slow to use the term of one another, especially in connection with the doctrine of the person of Christ. The followers of Apollinaris were specially charged with this heresy. See also APOTHEOSIS.

Anthropology ('science of man') is the most comprehensive term applicable to that branch of knowledge of which mankind forms the exclusive subject. Taken in its widest sense, it includes all subordinate divisions (*general anthropology*), while *special anthropology* deals with the *Hominidæ* as the chief branch of the group of *Primates*, and more particularly with their relations to the anthropoid members of that group. These anthropoids are the African gorilla and chimpanzee and the Asiatic gibbon and orang-utan, who are, in fact, the nearest akin to the human group. According to the now almost universally accepted principles of organic evolution, this kinship is not merely physical but *genetic;* that is to say, it is not merely an outward somatic resemblance, but an intimate connection based on common descent, or rather ascent, from earlier or more primitive forms.

The human group, however, does not spring from any of the four living anthropoids, but from a more generalised simian type from which all alike are derived independently, as shown in the appended

diagram arranged according to their cranial capacity, as indicated in cubic centimetres (c.c.):


European, 1550 to 1900 c.c.
Corrèze (La Chapelle), 1626 c.c.
Grimaldi, 1580 c.c.
Negro, 1380 to 1400 c.c.
Eskimo, 1546 c.c.
Neander, 1450 c.c.
Andamans, 1260 c.c.
Aurignac, 1100 c.c. (?).
Heidelberg, 1000 c.c. (?).
Pithec. erectus, 900 c.c.
Chimpanzee, 330 c.c.
Line of human ascent.
Gorilla and Orang, 500 to 600 c.c.

THE ANTHROPOID STEM.—Although all the c.c.'s cannot be depended upon, the general impression is left from this diagram that the earlier remains are not necessarily the lowest in mental capacity as had hitherto been supposed, or rather taken as a matter of course. Indeed, Professor Sollas does not hesitate to say that 'the primitive inhabitants of France were distinguished from the highest civilised races, not by a smaller, but by a larger cranial capacity; in other words, as we proceed backwards in time the human crane increases in volume.' This, of course, is only partly true, for nobody pretends to say that the Aurignac skull is of larger volume than, for instance, the Andaman. But, as far as it goes, it helps to explain the extraordinary mental powers of Palæolithic man, especially during the Aurignacian and Magdalenian divisions of the Old Stone Age. 'We know,' writes Professor A. C. Haddon, a cautious and discriminating student of this period, 'that they buried their dead, and in some cases provided weapons and food for use in a future state. Their inventiveness is proved by the variety and gradual improvement in the technique of their tools and weapons. Their carvings in the round or low relief, their spirited engravings on bone and ivory, and their wonderful mural paintings, whether in outline, shaded monochrome, or polychrome, evince an astonishing æsthetic sense and technical skill.'

Here it should be stated that it was the appearance of Darwin's *Origin of Species by Natural Selection* which, by giving unity of the organic world, established the necessary connection between the mammalian, as between all other orders of the animal kingdom. With the abolition of fixed species all was changed. 'The whole scientific and literary world, even the whole educated public, accepts, as a matter of common knowledge, the origin of species from other allied species by the ordinary process of natural birth. The idea of special creation, or of any altogether exceptional mode of production, is absolutely extinct. And this vast, this totally unprecedented, change in public opinion has been the result of the work of one man.' These words are by Alfred Russel Wallace, who, himself a co-worker with Darwin, did jointly with him for the organic world what Newton by his laws of gravitation had done for the inorganic.

GENESIS OF THE HOMINIDÆ.—Passing now from the anthropoid group as a whole to its culmination in man, it must now be asked what vital connection, if any, lies between the two groups. It may here be stated that a sought-for 'missing link' was found in 1892 by Dr Eugene Dubois in the fossil human remains discovered by him at Trinil in East Java, and commonly known as *Pithecanthropus erectus*, as named by him. These were a skull, some teeth, and a femur, which, although strewn about, are allowed to have formed parts of one body, and that almost certainly human or protohuman. They occurred in some late Pliocene or early Pleistocene beds, and if human would thus set the origin of man back some four or five hundred thousand years. But, of course, opinions differ, some holding them to be purely simian, others purely human, and others again intermediate, so that for the present we must be satisfied with Dr W. Duckworth's pronouncement that in *P. erectus* 'we possess the nearest likeness yet found of the human ancestor at a stage immediately antecedent to the definitely human phase, and yet at the same time in advance of the simian stage.' This view, it may be added, is supported by Dr W. J. Sollas, who has made a special study of the remains, and writes: 'The lowest term of the human series yet discovered is represented by *Pithecanthropus*, and dates from some part of the Pleistocene epoch.'

But while *P. erectus* thus remains for the present the starting-point in the history of mankind, several other relics have been brought to light both before and since its discovery, by which the organic evolution of the species may be traced back to extremely primitive forms. Appended are a few of the more conspicuous finds, more attention being paid to the later finds (*Corrèze, Combe Capelle*, &c.) than to the earlier (*Neanderthal, Spy*, &c.):

Neanderthal, near Düsseldorf, skull found 1856; enormous superciliary ridges; one of the most ape-like.

La Naulette, near Dinant, Belgium, lower jaw, highly prognathous.

La Denise, Upper Loire, two retreating frontal bones, glabella very prominent.

Krapina, in Croatia, the remains of some ten fossil men in a cave or rock-shelter, with rhinoceros; at least one frontal bone distinctly retreating; brow-ridge prominent; no chin proper; generally of Neander type; Mousterian dressed stones.

Le Moustier, Vézère Valley, a complete skeleton; flat retreating frontal; thick brow-ridges; chinless; high prognathism; Neanderthal type. The name *Homo mousteriensis* has been given to this man.

Brüx, near Prague, skull in parts like Neanderthal.

Spy, Namur district, two nearly perfect skeletons (man and woman) found 1886; huge superciliary ridges and glabella, rudimentary chin; Mousterian flints.

Galley Hill, Kent, nearly perfect skeleton with extremely long, narrow, and depressed skull, and prominent glabella and brow-ridges; significance doubtful.

Podbaba, near Prague, part of skull found 1883, with bones of extinct mammals (mammoth, rhinoceros); large brow-ridges and depressed frontal region like Neanderthal.

Predmost, near Prerau, Moravia; many skeletons found 1894, with mammoth; a variety of *Homo sapiens*; child with ivory necklace.

Marcilly, Evreux district, part of skull perhaps of Neanderthal type; deep depression between brow-ridges and frontal.

Mentone, Grimaldi or Balzi Rossi Caves, several skeletons, some of Cro-Magnon race, two of Negroid type (Grimaldi race).

Eguisheim, near Colmar, part of skull found 1865, with *Elephas primigenius*; prominent brow-ridges, frontal broad but retreating.

Laugerie Basse, Dordogne, male skeleton, two female skulls; thick parietals; c.c. above the modern average, save in one female skull very low (1100 c.c.).

Lagôa Santa, Minas Geraes, Brazil, over thirty remains of fossil man, with extinct fauna; all the skulls but one long, high, and narrow (hypsistenocephalic).

Rio Carcarañia, Argentina, pampas fossil relics like the above, but one skull short; significance doubtful.

Samborombón, South-east Buenos Aires, fossil skeleton found 1882, with Scelidotherium at a higher level.

Combe Capelle, Dordogne, complete skeleton found 1909 in a cave between the Mousterian and Solutrean strata; thought by Professor Klaatsch to be a distinct species (*Homo aurignacensis*) allied to the orang-utan, while the Neanderthal is closely related to the gorilla. These two would therefore represent two different human species or genera.

Heidelberg, fossil lower jaw found 1907 at Mauer, six miles south of Heidelberg; might be ascribed to an anthropoid ape but for the teeth, which are quite human. Next to *P. erectus*, it was the earliest human relic yet discovered, of Pliocene or more probably very early Pleistocene age; massive aspect; no chin; more primitive in some respects than the anthropoids. The Heidelberg fragment belongs to the 'Chellean' period, and is evidently much earlier than the Neander-Spy man. Its ape-like character is well seen in the arch of the teeth, which, instead of being semicircular, is in the form of three sides of a parallelogram. It has been named *Homo heidelbergensis*.

Corrèze, fossil skeleton found 1909 in La Chapelle-aux-Saints Cave, Corrèze district, Central France, with extinct fauna (woolly rhinoceros, &c.); of Mousterian period; skull like Neanderthal, extremely shallow and domeless, with retreating forehead, thick, prominent brow-ridges, and huge brain-cap much longer and broader than modern ones, about 1600 c.c., the average European being only 1500 to 1600. Formerly the estimate for the Neanderthal was only 1200, being based on the reduced volume due to the flatness of the skull; but an ordinary European skull as long and broad as the Neander-Corrèze would be about 2000 c.c.; yet the Neanderthal was actually a little bigger than the modern in some parts, but smaller in others. A later estimate for the average Neanderthal brain is 1450 c.c.

Gibraltar, found 1848, is of the same type as Neanderthal men, hence belongs with it to Schwalbe's *Homo primigenius* group; is the only one that shows the *face* in a perfect state; jaws very wide, but not longer than the modern European; upper jaw projects less than the Corrèze; the lower is very remarkable, owing to the retreating chin and the large size of the articulation with the skull; thick and large brow-ridges; and, like the Corrèze, the skull as a whole resembles the Eskimo.

Coldrum, near Maidstone, Kent, six skulls, and near them many other human remains, found 1910, lying without order, and apparently cut up before burial.

Astwick, near Biggleswade, North Bedfordshire, two skeletons (male and female) found November 1910 in or near the bed of the old river Ivel. The male seems to have been a chief of splendid physique, and the position of the woman suggests that she was slain and buried with him.

Cro-Magnon Cave, Eyzies district, Dordogne, numerous remains of more advanced type than Heidelberg or Neanderthal man, hence classed for a time either as very late *Palæolithic* or very early *Neolithic*, Cro-Magnon being taken as a sort of connecting-link between these two periods. It is now beyond doubt, however, that this race (the 'Cro-Magnon race') is Upper Palæolithic. It is common in the Aurignacian period.

St Brelade, Jersey, a number of teeth with strongly developed roots, found in a cave-dwelling in 1910, have been assigned to the Neanderthal race and the Mousterian culture.

The *Ipswich* man, found over a mile north of Ipswich in October 1911, was lying in glacial sand under the chalk-boulder clay. It was therefore claimed for it that except the Heidelberg jaw it was the oldest yet found in Europe; but it belongs to a much higher and less primitive type than the Neanderthal remains—'barely prehistoric' according to Professor Boule.

Piltdown, 1913. See EOANTHROPUS.

Wadjak, Java, two skulls (male and female), found in 1890, and described in 1921 by Dubois; regarded as Pleistocene on slight evidence; dolichocephalic; keeled cranial vault; receding forehead; superciliary ridges prominent; low orbits; jaw massive—as strong as the Heidelberg; woman's skull about 1550 c.c. (above European average or Australian maximum). *Homo wadjakensis* is regarded as a proto-Australian, indicating an East-Asiatic origin.

Talgai, on the Darling Downs, Queensland, found in 1884, described in 1914 and 1918; a boy's skull; face of Australian type, with primitive characters; 'a proto-Australian who had long possessed a human brain, but whose face retained much more brute-like relics of his origin' (Boule).

Oldoway, East Africa, almost complete skeleton found in volcanic tuff, 1914; skull large, dolichocephalic, of negroid type.

Boskop, Transvaal, portions of skull, lower jaw, and long bones found in 1914, if really Pleistocene, 'reveal the existence in Africa of a generalised type, not lacking affinity with certain men of our own Palæolithic, but already quite definitely negroid in character. At the same time they seem to furnish a new proof of the high antiquity of the human race, even in the countries it inhabits at the present day' (Boule).

Broken Hill, Rhodesia. See BROKEN HILL.

THE PALÆOLITHIC OR OLD STONE AGE.—Leaving out of account an obscure and not yet clearly defined *Eolithic Age*, and taking our starting-point from *Pithecanthropus erectus*, we find that the whole of the vast epoch (scarcely less, if less, than 500,000 years) which covers the early or prehistoric evolution of man comprises two great periods—the *Palæolithic* or *Old Stone*, and the *Neolithic* or *New Stone, Age*. Dr W. Branca speaks even of a million years: 'Almost a million of years would seem to have elapsed before these "lords of creation" thought of giving their rude implements (clubs, &c.) a more convenient form' (*Fossil Man*, p. 80). It has been satisfactorily established that the former, which greatly exceeded the latter in duration, was not stationary, but made considerable progress in cultural development even in somewhat early times. In this progressive development seven stages (or eight, if Azilian, &c. be included; see below) are commonly distinguished, where, however, allowance must be made for much overlapping in different parts and even in the same region. Many anthropologists indeed prefer to call them 'cultures' or 'industries' rather than 'periods.'

Lower Palæolithic, chipped flints, mostly round or oval, with or without cutting-edge and grip for handle. Their great age is shown by many which are deeply patined right through in various colours by natural agencies. This type is found almost everywhere in both hemispheres as far north as the Arctic Circle. Great numbers occur on the plateau formations through which the rivers have since eaten their way for scores and even hundreds of feet down to their present levels—that is, in milder pre-glacial or inter-glacial Pliocene or early Pleistocene times, when man lived in the open air more than in caves, and when the climate was everywhere warm or subtropical even in the higher latitudes. But later came the Cavern periods, when man resorted to the caves, as the third Ice Age set in.

1. *Pre-Chellean*, in which some recognise subdivisions, as Reutelian, Mafflian, Mesvinian, Strepyan. Rude *coups-de-poing* (hand-axes) and stone picks are found, as well as very crude knives and scrapers. The human workmanship of many is doubtful.

2. *Chellean*, named from Chelles on the Marne, a few miles above Paris. Implements similar to Pre-Chellean, but better made; long, pointed *coups-de-poing;* rude scrapers and awls.

3. *Acheulean*, named from St Acheul (Amiens). *Coups-de-poing* become more even of edge, sometimes twisted; broad, oval tools become more pointed; the 'Levallois flake' appears.

4. The *Moustierian*, or *Mousterian*, from Le Moustier Cave, on the Vézère affluent of the Dordogne, above Les Eyzies. This is the *First Cave Age* proper. The Chelleans and Acheuleans had used chiefly the core that was left of a flint nodule when flakes had been removed. Neanderthal man of the Mousterian culture preferred to trim and use the flakes themselves. The *coup-de-poing* is going out of use. The 'Mousterian points' are spear-headed flakes, smooth and flat on one side, pointed and edged on the other; the scraper is treated the same way, but with edge more on the side than at the end, as in all later artifacts; these occur at great depths in the caves in long association with a fauna adapted to a cold climate, most of the earlier forms having already disappeared. The Mousterian is sometimes called *Middle Palæolithic*.

Upper Palæolithic; a vast variety of implements far

in advance of Lower Palæolithic; gravers, end-scrapers, &c.; long, parallel flaking instead of 'resolved' (small) flaking; bone (formerly used only for anvils and the like), now made into borers, spatulæ, &c. The climate is still cold, but gradually approaches present-day conditions. New races of man (Cro-Magnon, Grimaldi, Chancelade), similar to the races of the present day.

5. *Aurignacian*, from Aurignac on the Garonne. This culture, probably derived from the Capsian of North Africa, is sharply marked off from all that went before it in Europe. For the marvellous art of the Aurignacians and Magdalenians, see ART.

6. *Solutrean*, from Solutré Cave, Mâcon district, Saône-et-Loire. This is an intrusive culture which does not reach all parts of the Aurignacian area. Art languishes, but the technique of flint shows a great advance, with typical flints of the beautiful 'laurel-leaf,' 'willow-leaf,' and other highly finished patterns, for variety and perfection of form never since surpassed, indeed unsurpassable in stone; large, thin spear-heads; scrapers with edge on the end; flint knives and saws, all still chipped, never ground or polished; bone or horn awls or borers, also flaked.

7. The *Madelenian*, or *Magdalenian*, from the La Madeleine rock-shelter on the Vézère between Le Moustier and Les Eyzies; a very long epoch, with numerous stations whose varied contents show resumption or continuation of Aurignacian art and general culture—scrapers, gravers, saws, and knives of flint flakes; borers, needles, harpoons, hooks, and diverse ornaments of bone, horn, and ivory; with etchings of seals, fishes, mammoths, reindeer, and other animals. From the abundance of the last-mentioned, this has been called the 'Reindeer Age.'

There are certain civilisations sometimes classed as Upper Palæolithic which show a transitional character—*Azilian* (named from Mas d'Azil in Ariège), *Maglemosian* (from Maglemose in Denmark), *Tardenoisian* (from Fère-en-Tardenois). The Azilian-Tardenoisian people made inferior implements of stone and bone. Minute flints (perhaps inserted as teeth in a wooden shaft) become common. Instead of round harpoons of reindeer horn, they had flat harpoons of red-deer horn. Mysterious painted pebbles were treasured by them. It is suggested that these people were being pushed westwards, like the Maglemosians farther north, by Neolithic incomers.

Many evidences have been brought to light of the presence of primitive man in the caves and elsewhere in Britain. The earliest recorded are those of Gray's Inn Lane, London, which yielded a pointed flint about 1680, associated with the bones of an elephant, and Hoxne in Suffolk, where some palæoliths were found in 1797 also with the relics of huge extinct fauna. In the Hatfield beds of East Anglia (Brandon, Thetford) occur late Tertiary flint-bearing deposits of great extent and at depths of 50 or 60 feet. More important were the varied contents of Kent's Cavern near Torquay, which was explored between 1825 and 1894 by Buckland, M'Enery, and especially Pengelly, and revealed hundreds of unpolished flints, needles, and other bone objects, with long-extinct faunas, such as mammoths, hyænas, cave-lions, cave-bears, reindeer, rhinoceros, machairodus latidens, &c. Near Kent's is the Brixham Cave, with similar contents; in Vale of Clwyd, North Wales, the Tremeirchion Cave; in Derbyshire, the Creswell Caves; in Settle, Yorkshire, the Victoria Cave, flint spears, scrapers, bone awls, ironstone tools, &c., with cave-lion, hippopotamus, hyæna, rhinoceros. Like contents in the Lotherdale Cave near Skipton; the Pont Newydd Cave, Derbyshire; the Lifynnon and others in Vale of Clwyd; Ilford and Grays Thurrock in Essex; Erith and Crayford in Kent; Finchampstead Hill Gravels in Berkshire, very old pre-glacial 'eoliths;' Chalk Plateau, Kent, rolled and other rude palæoliths like the foregoing; Canterbury Gravel-Beds; Stoke Newington; Paddington, &c. Here are numerous eoliths and palæoliths of all types, many of which are so rude that they have been by some observers ascribed to a Tertiary precursor. In any case, the wide range of Pleistocene man in Britain is placed beyond doubt.

Besides the above-recorded caves with human remains and works, many others have been brought to light, especially in Germany (*Gailenreuth*), Belgium, Spain, and Britain. Forty caves in the *Liège* district yielded some human bones, at first discredited, but now fully confirmed by Dr E. Dupont. In both of the Irish crannogs at Lagore, Co. Meath, and Lake Roughan near Dungannon, some human remains were found of very great age. Very valuable for the early development of human culture were the contents of the French cave at *Mas d'Azil*, and of that of *Altamira* in North Spain.

It may be inferred that the 'First Man,' as represented approximately by *Pithecanthropus erectus*, had already acquired sufficient mental and bodily characters to make his way over the globe when he set out on his first migrations. This early man could already use his hands to fashion his rude stone implements, and wield clubs and other tools ready to hand; he could walk erect, as shown by the above-described human femur, and had already occupied a relatively wide domain in Malaysia and perhaps Indo-China. He was also of the average height (5 feet 6 inches), and had a cranial capacity of not less than 900 c.c. Professor Osborn looks for the ancestors of man in the high plateaux of Asia or Europe. 'The arboreal theory of man's origin,' he says, 'has been given up.' 'His ancestors, if tree-living, left their trees in the middle of the period of the Age of Mammals.'

We cannot here trace the routes followed by our ancestral man, and it must suffice to say that he became the progenitor of the chief varieties of the human species which are all independently derived from Pleistocene ancestors in the several regions—Australasia, Eurafrica, Eurasia—to which they migrated in Palæolithic times. Thus is explained the close resemblance of the great divisions of mankind, all sprung from nearly related proto-human Pleistocenes in the Old Stone epoch; while the differences are to be attributed to long separation in new environments, under varying climatic and other local conditions. It should be observed, however, that though they may be said to represent our ancestors, neither Pithecanthropus nor Neanderthal is regarded as being in the direct line.

Here it is to be noticed that it was mainly, if not altogether, as a tool-using animal that *Homo sapiens ferus* (Linné's name for the earliest type of primitive man) made his way round the globe and acquired unchallenged ascendancy over all other organisms. 'The moment that the forerunner of man employed extraneous objects intelligently with a purpose as tools and weapons he ceased to be an ape and became a man. We must believe that the first use of tools and the psychic emergence were coincident and interdependent. . . . The reduction of the claws, teeth, and jaws was a correlative variation due to the assumption of the prehensile function by the hands and the attaining of the erect attitude' (Alton H. Thompson). So, too, Darwin: 'As man gradually became erect, and continually used his arms and hands for fighting with sticks and stones, as well as for other purposes of life, he used his teeth and jaws less and less,' &c. Man was thus better able to survive in the struggle for existence, especially as the development of his mental faculties went on hand-in-hand with the improvement of his arms and weapons. The very effort to perfect the use of these implements taught him to think; and thus it was that the brain received a constant stimulus, with the consequent reactions, in both directions—that is, the increase of manual skill and the evolution of his thinking power. When it was discovered that chipped flints could be made by hand, a great step was made in cultural progress,

and a vast field of resources opened up to primitive man. The very first step towards the modification of natural products marked 'his complete emergence from the animal stage. From this point on his mental evolution was rapid' (Thompson). It is thus seen that from the very dawn of human awakening 'the tool sense has been the power that dictated mental evolution' (*ibid.*). It would be idle to ask which came first, the mind or the brain, as it must now be obvious that both went *pari passu* together, since the two (function and organ) are interdependent one on the other. 'Organ and function are developed together; neither creates the other' (Keane).

THE NEOLITHIC OR NEW STONE AGE.—Although the Neolithic Age was much shorter than the Palæolithic, it was still of very great duration. During such an epoch there was necessarily a good deal of overlapping, so that it is not always easy to draw a clear line of demarcation between the two periods. In fact the line between Lower and Upper Palæolithic is much sharper. Some arts and crafts supposed to be exclusively Palæolithic have been carried on far into what are admittedly Neolithic times, even indeed to the present day; but when the question is viewed as a whole, it is seen that later periods present some marked features which are quite unknown to the Palæolithic. Such especially are the dolmens, menhirs, circular and other stone structures, and later a more or less extensive familiarity with the metals—tin, copper, bronze alloys, and iron, in the order named. Other differences are the practice of agriculture, the domestication of animals, making of pottery, more general use and control of fire, and the stone objects themselves, formerly chipped only, later polished and of more varied types, as in the here appended comparative table of Palæolithic and Neolithic culture:

OLD STONE AGE.	NEW STONE AGE.
Climate—Warm at first, cold later.	*Climate*—Cold at first; warm, or as at present, later.
Fauna—Mammoth, hippopotamus, cave lion and bear, hyæna, reindeer; no domestic animals.	*Fauna*—Mainly as at present; bear, fox, beaver; horse, dog, ox, sheep, goat, swine, and other domestic animals numerous.
Human Types—Mainly dolichocephalic or long-headed. Heidelberg and Neanderthal types are succeeded in later times by modern man.	*Human Types*—Both long and brachycephalic (round or short) headed, generally mixed as at present.
Fire—At first known only, later partly under control.	*Fire*—Under full control.
Food—At first mainly vegetable, later animal also, obtained by hunting and fishing only, and perhaps mostly eaten raw.	*Food*—Omnivorous as at present, mostly cooked, and obtained by hunting, fishing, tillage, and stock-breeding.
Cultivated Plants—None.	*Cultivated Plants*—Numerous (cereals, pulse, fruits, &c.).
Industries—Limited to rude clubs, chipped stone, bone and horn later, of various early types, never ground or polished; no pottery, but later artistic sense very highly developed.	*Industries*—Polished stone implements of diverse types; pottery; basketwork; spinning; weaving; mining; artistic sense debased.
Monuments—None; no houses, graves, or burial at first; some 'tectiform' designs have been interpreted as architectural drawings.	*Monuments*—Monolithic and megalithic numerous; houses, pile-dwellings, barrows, tombs.
Religion—Cave art has probably a religious or magical meaning; images of what seems to be a mother goddess.	*Religion*—Animistic, spirit or ancestor worship; immortality.
Speech—At first inarticulate, later crude or inorganic.	*Speech*—Articulate and structural; stock languages numerous and of various types, irreducible to one origin.

It must now be asked, whence did these Neolithic peoples really come? The question bristles with difficulties; but if it can be properly solved, it will help to explain the tangled web of the present mixed European peoples. It is allowed, or it can be proved, that many came from North Africa, and it is equally, some will say more, certain that others reached Europe from Asia. We have therefore two fundamental elements—the Eurafricans and the Eurasians—who have long been fused in the present European populations.

Assuming this twofold occupation of Europe from the south and east, the question arises, what has become of the various forms of speech that should represent these Eurafrican and Eurasiatic intruders? At present, and indeed throughout the historic period, with a few trifling exceptions, only *one* linguistic family is in possession of the continent—that is, the so-called 'Aryan' or 'Indo-European,' comprising the *Hellenic* in the south-east, the *Italic* in the south and west, the *Keltic* in the extreme west, the *Teutonic* in the centre, north, and north-west, and the *Letto-Slavonic* throughout the east. These are all sister-languages, which are derived unquestionably from the long-extinct Aryan mother-tongue, and have been in possession of nearly the whole continent from time out of mind. Whatever their origin, whether Asiatic, Eurasiatic, or European, as is now often held, they have made a clean sweep of all their Eurafrican forerunners, which are now represented only by the solitary *Basque* of the Western Pyrenees, which is undoubtedly of Iberian—that is, Eurafrican—origin. All the other Eurafrican tongues—Ligurian, Pelasgian, and possibly others—have disappeared, or rather have been absorbed or assimilated to the dominant Aryan, which has thus remained the unrivalled mistress of the continent from prehistoric—that is, Neolithic—times. The phenomenon is remarkable, but by no means unique, for analogous expansions of powerful linguistic families have occurred elsewhere, as in Africa, where the conquering Bantu tongue prevails almost without a rival from about the equator to the extreme south. Most archæologists postulate a Mediterranean race, largely African, but extending to the British Isles; an intrusive Eurasian Alpine or mountain race; and Nordic or Teutonic invaders from the northern forest-lands.

Consult Broca, *Caractères physiques de l'Homme Préhistorique* (1868); Boyd Dawkins, *Early Man in Britain* (1880); Darwin, *Descent of Man* (1871); Dupont, *L'Homme pendant les Ages de la Pierre* (1872); Sir J. Evans, *The Ancient Stone Implements of Great Britain;* Frazer, *The Golden Bough;* Haeckel, *Evolution of Man* (1904); Keane, *Man, Past and Present* (1899; new ed. 1920); Lord Avebury, *Prehistoric Times* (1890); Sir Charles Lyell, *Antiquity of Man* (1863); G. de Mortillet, *Le Préhistorique* (1883); Prichard, *The Natural History of Man* (1848); De Quatrefages, *The Human Species* (1879); Romanes, *Mental Evolution in Man* (1888); Schrader, *Prehistoric Antiquities of the Aryan Peoples* (1890); Topinard, *Éléments d'Anthropologie* (1885); Tylor, *Primitive Culture* and *Anthropology;* Waitz, *Anthropologie der Naturvölker* (1864); Sir D. Wilson, *Prehistoric Man* (1863); Marett, *Anthropology* (1912); A. C. Haddon, *History of Anthropology* (1912); Geikie, *Antiquity of Man in Europe* (1914); Keith, *Antiquity of Man* (1915); Obermaier, *El Hombre Fósil* (1916); Déchelette, *Manuel d'Archéologie Préhistorique Celtique et Gallo-romaine* (1908-14); Osborn, *Men of the Old Stone Age* (New York, 1918); R. Moir, *Pre-palæolithic Man* (1920); J. M. Tyler, *The New Stone Age in Northern Europe* (1921); Burkitt, *Prehistory* (1921); Macalister, *Text-book of European Archæology* (1921 *et seq.*); Boule, *Fossil Men* (trans. 1923). In *Ancient Hunters and their Modern Representatives* (new ed. 1924), Professor Sollas maintains that the Mousterians survive in the native Australians, the Solutreans in the Bushmen, the Magdalenians in the Eskimo and perhaps the American Red Indians. See also the articles ANTHROPOID APES, ART, MAN, ETHNOLOGY, IMAGES, MAGIC, SKULL, PITHECANTHROPUS, PLEISTOCENE, POST-GLACIAL SYSTEM, STONE AGE.

Anthropometry, the measurement of the dimensions and proportions of the human body

for comparison or identification. Cranial measurements (see SKULL) vary so much within the same tribe as not to be of themselves sufficient data on which to rest generalisations. Quetelet defined the general types of mankind by measuring height, weight, complexion, and the like. French anthropologists adopted a form of schedule containing as many as 102 different observations of a single individual. Collignon reduced these for practical use to about 20. The French police first systematically employed anthropometric methods for the identification of criminals, carefully recording for future use the various measurements (see BERTILLON, FINGER-PRINTS).

Anthropomor'phism, the application to God of terms which properly relate to the bodily or mental qualities of human beings. Thus even in the Scriptures we read of the eye, the ear, the arm, the hand of God; and of his remembering and forgetting. In Exodus, God rests and is refreshed. The Audæans, a 4th-century Syrian monastic sect which sprang up, were accused of holding that God was possessed of a human shape. Hobbes and Priestley ascribed to the Divine Being a sort of subtile body. Spinoza was resolutely anti-anthropomorphic in all his thoughts of God. Fichte rejected the very doctrine of the personality of the Divine Being as anthropomorphic, and represented God as the moral order of the universe. Pantheism is at the opposite pole from anthropomorphism; Theism implies at least intellectual and moral kinship between God and man; Mansel's doctrine of the relativity of knowledge was not unjustly held to cut at the roots of faith.

Anthropoph'agi. See CANNIBALISM.

Antiar (Javanese *Antschar*), the Upas (q.v.) tree; Antiarin is its poisonous principle. Antiar Resin is a non-poisonous product of the same tree.

Anti'bes (anc. *Antipolis*), a small seaport in the French department of Alpes Maritimes, 7½ miles E. of Cannes; pop. 12,000. The *Antibes Legion*, a body of foreign troops, chiefly French, kept by the pope during the French occupation of Rome, was formed here.

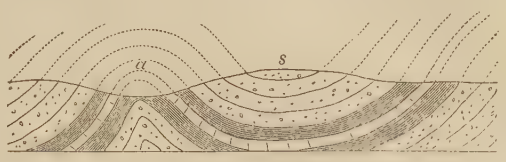
Anti-burghers, the name of a former religious denomination in Scotland; see UNITED PRESBYTERIAN CHURCH.

Antichlor, any substance, such as hyposulphite of soda, used to remove from paper pulp the last traces of free chlorine; see PAPER.

Antichrist, a name which occurs only in the epistles of St John, was very variously applied by Christians either to false Christs, actual or hypothetical, to heretics, or to various enemies of Christianity and the people of God. The meaning of the word was modified by elements taken from the 'Man of Sin' in 1 Thessalonians, from the Beast in the Apocalypse, from traditions of Antiochus Epiphanes, from anti-Messianic conceptions derived from the Jewish Apocalypses, and from Satan himself, the enemy of mankind. The idea became complex and not fully self-consistent, and was applied as the hatreds and fears of the church or the sects at various times suggested. Thus it was by some directly identified with heathenism or with the devil; with the Roman power; with the Emperor Caligula, or more especially Nero (see APOCALYPTIC NUMBER); with Simon Magus, Mohammed, the Grand Turk; with Napoleon I. and Napoleon III., or with a great enemy of God's people who was yet to appear before the end of the world; and for long it was a mark of Protestant orthodoxy to refer the term simpliciter to the Pope.

See for details, sources, and bibliography, Bousset, *Antichrist* (1895; trans. by A. H. Keane, 1896).

Anticline (Gr. *anti*, 'against,' *klinō*, 'I bend'), in Geology, applied to strata which are inclined in opposite directions *from* a common axis—that is, in a roof-like form. *Saddleback* is another term used for the same structure. *Syncline* (Gr. *syn*, 'together,' and *klinō*) is the converse of anticline, and is applied to strata which are inclined in



a, Anticline; *s*, Syncline.

opposite directions *towards* a common axis. Anticlinal and synclinal structures have resulted from the lateral compression and consequent folding of formerly horizontal or approximately horizontal strata. See under GEOLOGY, MOUNTAINS.

Anti-corn-law League. See CORN-LAWS.

Anticosti, an island in the Gulf of St Lawrence, which it divides into two channels, with lighthouses at different parts of the coast, and about 140 miles long, and 30 miles broad in the centre. The hills in the interior rise to about 600 feet. Anticosti has two good havens, one at Ellice Bay, near the western end, and the other at Fox Bay, in the NW. The climate is severe; while the surface is an alternation of rocks and swamps. It is visited by fishermen in the summer, but there are hardly any inhabitants save light-house-keepers and a few officials. The island, which is attached to the Canadian province of Quebec, has considerable salmon, trout, cod, and herring fisheries, and is a resort for seal and bear hunting. Marl and extensive peat deposits are found. In 1895 the island (area, 2600 sq. m.) was purchased by M. Menier, of chocolate fame, and stocked as a game preserve. In 1926 he sold it to a paper-pulp company.

Anti'cyra, (1) the modern Aspraspitia, an ancient Greek town in Phocis, built on a peninsula in a bay on the Corinthian Gulf. In its neighbourhood grew the best hellebore, a sovereign remedy with the ancients for madness, hence the well-known proverb, *Naviget Anticyram* ('Let him sail to Anticyra'), spoken of a person when he acted senselessly.—(2) A town of Thessaly, on the Sinus Maliacus, also noted for its hellebore.—(3) A town of Locris, at the entrance of the Corinthian Gulf, often confounded with the Anticyra in Phocis. Horace (*Ars Poetica*, 300) speaks as if all three places produced hellebore, *Tribus Anticyris caput insanabile* ('a head not to be cured by the three Anticyras').

Antidote (Gr., 'given against'), a counter-poison. See POISONS.

Antietam, a narrow but deep river in Maryland, United States, falling into the Potomac 7 miles above Harper's Ferry. On its banks, near Sharpsburg, was fought a bloody battle between the Union troops under M'Clellan, and the Confederate army under Lee, in which the former remained master of the field, though at a loss of nearly 13,000 men.

Antifebrin, or ACETANILID, $CH_3{\cdot}CO{\cdot}NH{\cdot}C_6H_5$, a white colourless powder, with burning taste, is almost insoluble in cold water, though readily soluble in alcohol. It is derived from anilin by the action of glacial acetic acid. It is used medicinally for reducing temperature in fevers, but requires very careful use, as several deaths have occurred after administration. It is very similar

to antipyrin in action, but is more powerful and less dangerous.

Antig'oné, daughter of Œdipus by his own mother Jocasta, and sister of Eteocles, Polynices, and Ismene. She accompanied her father in his exile to Colonus in Attica, and after his death returned to Thebes. When her brothers, Eteocles and Polynices, had both fallen in single combat, and Creon had forbidden on pain of death the burial of the latter, Antigone alone dared disobey. She covered her brother's body with earth, and was in consequence shut up in a subterraneous cave, where she perished. Her lover, Hæmon, son of Creon, destroyed himself beside her corpse. Antigone, as the ideal of feminine duty and filial devotion, has been immortalised by Sophocles in his noble tragedies, *Œdipus at Colonus* and *Antigone*. Æschylus's tragedy upon her story is lost, but she figures in his *Seven against Thebes*, and in the *Phœnissæ* of Euripides.

Antig'onus, surnamed the 'One-eyed' (*Cyclops*), one of the generals of Alexander the Great, received in the division of the empire, after the death of the latter, the provinces of Phrygia Major, Lycia, and Pamphylia. After the death of the regent Antipater in 319, he aspired to the sovereignty of Asia, and waged incessant wars against the other generals, making himself master of all Asia Minor and Syria. In 306 he assumed the title of king, but was defeated by Lysimachus, Cassander, and Seleucus in the decisive battle of Ipsus, in Phrygia, in which he was slain, 301 B.C. He was the father of Demetrius Poliorcetes.

Antigonus Gon'atas, son of Demetrius Poliorcetes, king of Macedonia, and grandson of the great Antigonus. He did not mount his throne until 276 B.C., about seven years after his father's death. Driven out of his kingdom in 273 by Pyrrhus of Epirus, he recovered it in the following year, and kept it until his death in 239. See monograph by Tarn (1913).

Antig'ua, the most important of the Leeward Islands (West Indies), is 28 miles long and 14 wide, and in Boggies Hill attains a maximum altitude of 1328 feet; area, 108 sq. m.; pop. (1911) 31,400. Antigua was discovered in 1493 by Columbus, who is said to have named it after a church in Seville, called Santa Maria La Antigua. It was first settled by a few English in 1632, having till then remained, in fact, uninhabited on account of the great scarcity of fresh water. A number of colonists were sent here by Lord Willoughby, to whom Antigua was granted by Charles II. in 1663. For a time occupied by the French, it was declared British by the Treaty of Breda (1667). Antigua is the seat of the governor, executive and legislative councils, of the Leeward Islands; of the legislative council (with eight official and eight unofficial members) of the Antigua presidency; and of an Anglican bishop. It has suffered severely from earthquakes —in 1689, 1843, and 1874; and from hurricanes, as in 1899. The average rainfall is 44 to 45 inches. Numerous islets, rocks, and shoals border the shore, rendering access difficult and dangerous. St. John, the chief town (pop. 8000), stands at the head of a safe and capacious bay in the north-west, which unfortunately does not admit large vessels, as can English Harbour, near Falmouth, on the south coast.

Sugar is the principal product and manufacture; syrups, cotton, limes, pine-apples, and onions are also exported. With Barbuda and Redonda, Antigua forms one of the five presidencies of the Leeward Islands. Crown colony government was introduced in 1898. The annual value of imports, as of exports, ranges from £100,000 to £300,000. The population of the presidency in 1911 was 32,300, over 30,000 being black or coloured.

Anti-Jacobin. See CANNING, FRERE.

Anti-Lebanon. See LEBANON.

Antilegom'ena (Gr., 'spoken against'), a term applied to those books of the New Testament not at first accepted by the whole Christian Church, but ultimately admitted into the Canon—the seven books of 2 Peter, James, Jude, Hebrews, 2 and 3 John, and the Apocalypse. The other books were called *homologoumena* (Gr., 'agreed to'). See BIBLE, and the articles on the books named.

Anti-Libanus. See LEBANON.

Antilles, a term applied to the whole of the West Indies (q.v.) except the Bahamas. A hypothetical island, Antilia, had figured in old sea-charts as early at least as 1424; and that name was applied in 1493 by Peter Martyr d'Anghiera to the West Indies. The Greater Antilles are Cuba, Jamaica, Hayti, and Porto Rico; the others are known as the Lesser Antilles.

Antimony—symb. Sb (Lat. *stibium*); equiv. 120—is a brittle metal of a flaky, crystalline texture and a bluish-white colour. It is readily reduced to powder by ordinary pulverisation; when heated to 1168° F. (631° C.) it fuses, and being allowed to cool, solidifies in rhombohedral crystals, which are isomorphous with those of arsenic. Heated to 2462° F. (1350° C.) in a retort, where the oxygen of the air is excluded, as in an atmosphere of hydrogen, antimony volatilises as the vapour of the pure metal. When raised in temperature in contact with the air, it burns with a white light—combining with the oxygen of the atmosphere, and forming copious white fumes of the sesquioxide of antimony, or 'flowers of antimony.' The metal is a bad conductor of heat and electricity, but may be used, in conjunction with bismuth, in the construction of thermo-electric piles. Exposed to the air at ordinary temperatures, antimony does not tarnish or rust; and this property, combined with the hardness of the metal and of its compounds, renders antimony of essential service in the useful arts, in the composition of alloys, such as Britannia metal, type metal, pewter, and white or anti-friction metal. Precipitated powder of antimony, called *antimony black*, has been used for giving an iron-like appearance to casts.

Stibnite, or gray antimony ore, the impure sesquisulphide of antimony, Sb_2S_3, is the principal source of the metal. This substance has long been employed in the East for darkening the eyebrows. Native antimony is found, but rather sparingly, associated with a few other metals. Antimony is smelted in France, where ore is found abundantly, in Germany, and in England, which gets ore from Sweden, Borneo, and elsewhere; it is known to exist in Italy, Spain, and China; and stibnite was formerly mined in Britain. Although the extraction of antimony from its ore is a simple matter, there are several processes employed. Sometimes 'crude antimony,' or purified sulphide of antimony, is produced by liquation as a first stage in the operation. From this there are two or three ways of obtaining the impure metal, called 'regulus of antimony.' This raw antimony, whether obtained from the purified sulphide or direct from the ore, requires a calcination to separate such impurities as arsenic, iron, lead, copper, and sulphur. In the English process of getting it direct, the ore is smelted along with some alkaline slag and old scrap-iron in crucibles. When the mixture is completely fused, it is poured into conical moulds, and the contents of these, after cooling, consist of impure antimony and a slag of sulphide of iron. There are several methods in use for purifying the raw antimony (regulus). One of the simplest is to charge each of a number of crucibles with this regulus along with

some soda, common salt, and pure oxidised antimonial ore. When heat is applied, the foreign metals become oxidised and scorified, and nearly pure antimony or star metal is obtained.

The compounds of antimony are numerous: with oxygen it forms (1) the *trioxide* of antimony, or *white antimony ore*, Sb_2O_3, which enters into the composition of tartar emetic; (2) *antimony tetroxide*, Sb_2O_4, which forms one of the components of Dr James's powders; (3) *antimony pentoxide*, Sb_2O_5, a very insoluble compound, obtained by acting upon the metal with concentrated nitric acid. With sulphur, antimony forms the *subsulphide*, Sb_2S_3, already referred to as a natural ore of the metal, and which when roasted at a temperature sufficient to fuse it, passes into the mixed sesquioxide and subsulphide of antimony known commercially as the *glass of antimony*, used for colouring glass and porcelain yellow. A native oxysulphide, of a pretty red colour, is called *red antimony ore*. When the ordinary sulphide of antimony is boiled with potash, or the carbonate of potash, it dissolves; and thereafter, on boiling, deposits a reddish-brown substance, known as *mineral kermes*. The liquid from which the deposit has fallen, if treated with hydrochloric acid, throws down an orange precipitate of *golden sulphide* of antimony.

There is also a chloride of antimony, $SbCl_3$, prepared by heating sulphide of antimony and hydrochloric acid together, and which has the common name of *butter of antimony*. It is generally obtained as an oily liquid, of the consistence of melted butter, and of a golden-yellow colour. Mixed with olive oil, it is used by gunmakers as *bronzing salt*, to impart a yellow colour to gun-barrels.

Various compounds of antimony are used as medicinal agents, both in human and veterinary practice, especially the *tartar emetic*, a double tartrate of antimony and potash, $(KSbOT)_2H_2O$, which is the active ingredient in antimonial wine, sherry constituting the bulk of the compound. Several cases have occurred where tartar emetic has been used criminally as a poison.

'Basil Valentine' (q.v.), in his *Triumphal Chariot of Antimony*, says, 'the shortness of life makes it impossible for one man thoroughly to learn antimony, in which every day something of new is discovered.'

Antino'mianism (Gr. *anti*, 'against,' and *nomos*, 'law'), the doctrine or opinion that Christians are freed from obligation to keep the law of God. It is generally regarded by advocates of the doctrine of justification by faith, as a monstrous abuse and perversion of that doctrine, upon which it usually professes to be based. From several passages of the New Testament, as Rom. vi. and 2 Pet. ii. 18, 19, it would seem that a tendency to antinomianism had manifested itself even in the apostolic age; and many of the Gnostic sects were really antinomian, as were probably also some of the heretical sects of the middle ages; but the term was first used at the time of the Reformation, when it was applied by Luther to the opinions advocated by John Agricola (q.v.). Agricola had adopted the principles of the Reformation; but in 1527 he found fault with Melanchthon for recommending the use of the law, and particularly of the ten commandments, in order to produce conviction and repentance, which he deemed inconsistent with the gospel. Ten years after, he maintained in a disputation at Wittenberg, that as men are justified simply by the gospel, the law is in no way necessary for justification or for sanctification. The 'Antinomian Controversy' of this time, in which Luther took a very active part, terminated in 1540 in a retractation by Agricola; but views more extreme than his were afterwards advocated by some of the English sectaries of the period of the Commonwealth; and without being formally professed by a distinct sect, antinomianism has been from time to time reproduced with various modifications. It ought, however, to be borne in mind that the term has no reference to the *conduct*, but only to the *opinions* of men; so that men who practically disregard and violate the known law of God, are not therefore antinomians; and it is certain enough that men really holding opinions more or less antinomian, have in many cases been men of moral life. It is also to be observed that the term has been applied to opinions differing very much from each other. In its most extreme sense, it denotes the rejection of the moral law as no longer binding upon Christians; and a power or privilege is asserted for the saints to do what they please without prejudice to their sanctity; it being maintained that to them nothing is sinful; and this is represented as the perfection of Christian liberty. But besides this extreme antinomianism, than which nothing can be more repugnant to Christianity, there is also sometimes designated by this term the opinion of those who refuse to seek or to see in the Bible any positive laws binding upon Christians, and regard them as left to the guidance of gospel principles and the constraint of Christian love. Antinomianism usually originates in mistaken notions of Christian liberty, or in confusion of views as to the relation between the moral law and the Jewish law of ceremonial ordinances.

Antin'ŏus, a youth of extraordinary beauty, a native of Claudiopolis, in Bithynia, the favourite of the Emperor Hadrian, and his companion in all his journeys. He was drowned in the river Nile, near Besa, in 122 A.D., perhaps through suicide, either from weariness of the life he led, or from a superstitious belief that his voluntary death would avert disaster from the emperor. The emperor's grief knew no bounds—he enrolled him among the gods; built in his honour Antinoöpolis on the ruins of Besa, as well as numerous temples in Bithynia, Arcadia, and elsewhere. Antinous became, on Hadrian's account, a favourite subject for art, and many statues, busts, gems, and medals exist, representing him as the ideal of youthful manly beauty, often also with the added attributes of deity. Some of these rank among the masterpieces of Roman art, especially the colossal statue in the Vatican representing the youth as Dionysus, with ivy crown and hanging locks; the statue in the Capitoline Museum; and the marble bust in relief in the Villa Albani. Antinous's relations with Hadrian form the subject of the well-known romances, *Antinous*, by George Taylor, and *Der Kaiser*, by Ebers. See Dietrichson's *Antinous* (Christiania, 1886).

An'tioch, the ancient capital of the Greek kings of Syria, and long the chief city in Asia, lies in a fertile and beautiful plain, on the left bank of the river Orontes, 14 miles from the sea. In ancient times by its navigable river and its harbour, Seleucia, it had communication with all the maritime cities of the West; while it became on the other hand an emporium for the merchandise of the East, for behind it lay the vast Syrian desert, across which travelled the caravans from Mesopotamia and Arabia. Thus through it passed the high-road between Europe and Asia. It received from Strabo the name of *Tetrapolis* ('four cities'), on account of three new sites having been built upon successively, and each surrounded with a wall. The city was erected by Seleucus Nicator about 300 B.C., and was the most splendid of the sixteen cities built by him in honour of his father Antiochus. In early times a part stood upon an island which has now disappeared. The rest was built partly on the

plain, and partly on the rugged ascent towards Mount Casius (*Jebel Okrah*), amid vineyards and fruit-trees. The ancients called it 'Antioch the Beautiful,' and 'the Crown of the East.' It was a favourite residence of the Seleucid princes, and of the wealthy Romans, and was famed throughout the world for its splendid luxury. Its public edifices were magnificent. The city reached its greatest glory in the time of Antiochus the Great, and under the Roman emperors of the first three centuries. At that time it contained 500,000 inhabitants, and vied in splendour with Rome itself. Nor did its glory fade immediately after the founding of Constantinople; for though it then ceased to be the first city of the East, it rose into new dignity as a Christian city. It was one of the earliest strongholds of the new faith—indeed, it was here that the name of *Christians* was first used. During the apostolic age it was the centre of missionary enterprise, and it became the seat of one of the four patriarchs. Ten councils were held here from 252 to 380. Churches sprang up exhibiting a new style of architecture which soon became prevalent; and even Constantine himself spent a considerable time here, adorning it, and strengthening its harbour, Seleucia. The downfall of the city dates from the 5th century. In 538 it was reduced to ashes by the Persian king Chosroes, but it was partly rebuilt by Justinian. The next important event in its history was its conquest by the Saracens in the 7th century. In the 9th century it was recovered by the Greeks under Nicephorus Phocas, but in 1084 it again fell into the hands of the Mohammedans. The Crusaders besieged and took it in 1098. At the close of the 13th century, the sultan of Egypt seized it. At present it has a population of 25,000, mostly Turks employed in silk-culture, eel-fishing, soap-making, and corn and oil production. Its modern name is *Antakieh*. It exhibits almost no traces of its former grandeur, except the ruins of the walls built by Justinian, and of the fortress erected by the Crusaders. It suffered from an earthquake in 1872. See a history by Bouchier (1921).

Antioch, in Pisidia, founded also by Nicator, was declared a free city by the Romans in the 2d century B.C., and made a *colonia* under Augustus, with the name Cæsarea; see Sir W. M. Ramsay's *Cities of St Paul* (1908).

Anti'ochus, the name of thirteen kings of Syria of the Seleucid dynasty. —ANTIOCHUS I., surnamed Soter (reigned 281–261 B.C.), the first of the Syrian dynasty of the Seleucidæ, was the son of Seleucus, one of the generals and successors of Alexander. The murder of his father in 281 gave him the whole Syrian empire, but left him too weak to assert his right to Macedonia. Antiochus gained the name of Soter ('Saviour') for a victory over the Gauls, but fell in a subsequent battle with them in 261. —ANTIOCHUS II. (261–246), surnamed Theos ('God') by the Milesians, whom he freed from their tyrant Timarchus. On the death of Ptolemy, whose daughter Berenice he had been compelled to marry, Antiochus recalled his former wife Laodice; but she, in revenge for the insult which she had received, caused Antiochus to be murdered, along with Berenice and her son. Antiochus lost the provinces of Parthia and Bactria.—ANTIOCHUS III., surnamed the Great, the son and successor of Seleucus Callinicus, and grandson of the preceding, was the most distinguished of the Seleucidæ. He reigned from 223 to 187. He failed in his attempts to recover Parthia and Bactria, and waged war with success against Ptolemy Philopater, and though defeated in a great battle fought at Raphia near Gaza (217), he afterwards obtained entire possession of Palestine and Cœle-Syria (198). In this war he was assisted by the Jews, to whom he granted many privileges. Fearing the power of the Romans, Antiochus at length concluded a peace with Egypt, betrothed his daughter Cleopatra to the young king Ptolemy, and gave her Cœle-Syria and Palestine as a dowry. He afterwards became involved in war with the Romans, who had conquered Macedonia; but he declined to invade Italy at the instigation of Hannibal, who had come to his court for refuge. He crossed over into Greece, but was defeated in 191 at Thermopylæ, and in 190 by Scipio at Magnesia. Peace was granted him only on condition of his yielding all his dominions east of Mount Taurus, and paying a heavy tribute. In order to raise the money, he attacked a wealthy temple in Elymais, when the people rose against him, and killed him (187 B.C.).—ANTIOCHUS IV. (175–164 B.C.), surnamed Epiphanes, fought against Egypt and conquered great part of it. He twice took Jerusalem; and, endeavouring there to establish the worship of Greek gods, he by his tyranny and sacrilege excited the Jews to a successful insurrection under their leaders Mattathias and his heroic sons, the Maccabees.—The last of the Seleucidæ, ANTIOCHUS XIII. (Asiaticus), lost his kingdom to Pompey, who made Syria a Roman province (65 B.C.).

Antiope. See AMPHION.

Antipædobaptist is a term derived from Greek words for one who objects to infant-baptism. See BAPTISTS.

Antip'aros (anc. *Oliaros*), one of the middle Cyclades in the Ægean Sea, close to Paros. It is well cultivated and tolerably fertile, nearly 14 sq. m. in area, and contains about 500 inhabitants. Rich lead mines were discovered in 1872. Its wonderful stalactite grotto is not alluded to by any Greek or Roman writer, but has been well known since 1673. The entrance forms a wide natural portico on the south-west side of a mountain, from which the visitor reaches the first spacious vault by means of ropes and ladders. To go farther is still more difficult. At a depth of 918 feet under the entrance, the chief chamber is reached. It is 312 feet long, 98 wide, and 82 high, and is covered everywhere with the most wonderful stalactite and stalagmite formations.

Antip'ater, (1) a general highly trusted by Philip and Alexander the Great, left by the latter as regent in Macedonia when he crossed over into Asia, 334 B.C. He discharged the duties of this office with great ability, suppressing the insurrections in Thrace and Sparta; but he was about to be superseded by Craterus, through the influence of Olympias, when Alexander died. The government of Macedonia was assigned to him anew, in conjunction with Craterus; and soon after, he was called upon to defend himself against an alliance of the Grecian states. The war, usually called the Lamian war, from Lamia where Antipater was besieged in 323, was terminated by the defeat of the confederates in 322. The murder of his unsuccessful rival, Perdiccas, in Egypt in 321 B.C., left Antipater the supreme regency of the kingdom, and the guardianship of Alexander's children. He died at an advanced age in 319.—(2) The father of Herod the Great, appointed by Julius Cæsar procurator of Judæa in 47 B.C. He was poisoned in 43 B.C.—(3) The son of Herod the Great by his first wife, a worthless prince, who was perpetually conspiring against the life of his brothers, but was executed in prison five days before Herod died.

Antip'athy is the term applied to a class of cases in which individuals are disagreeably affected by, or violently dislike, things innocuous or agreeable to the majority of mankind. These peculiarities are sometimes innate—James I.'s, for instance,

to a drawn sword; sometimes they are due to a child's having been injudiciously terrified with some object, the mental impression becoming permanent. In many cases, antipathy arises from mental association, often unconscious, of one object or impression with some other admittedly unpleasant, or with some painful experience in the past life of the person affected. A large class of persons have an antipathy to animal food, and from childhood refuse to taste it. In others, again, the aversion is limited to one kind of meat, as veal or pork; others are averse to eggs or milk. Nor is this feeling a conscious caprice, which an exertion of the will might remove; for it is generally found that contact with the object of the antipathy is resented by the bodily economy, and symptoms of poisoning are rapidly produced. Some are affected with these symptoms who have no mental aversion to the article. Some medicines affect particular persons dangerously, even when given in very minute doses; on others, medicines have a peculiar effect —astringents may purge. The air of some places has a peculiar influence on individuals.

The most remarkable antipathies are those affecting the special senses. Nearly all persons have a loathing at reptiles, but some few *faint* on *seeing* a toad or lizard, others on seeing insects. Tycho Brahé fainted at sight of a fox, Henry III. of France at that of a cat, and Marshal d'Albert at a pig. *Hearing* a wet finger drawn on glass, the grinding of knives, or a creaking wheel, is sufficient to produce fainting in some. *Smelling* musk or ambergris throws some into convulsions; and we have seen how articles of food affect others—often, no doubt, owing to perverted taste. The *touch* of anything unusually smooth has the same effect sometimes. Zimmerman records the case of a lady who was thus affected by the feeling of silk, satin, or the velvety skin of a peach.—Strong predispositions towards things, also of frequent occurrence, constitute a converse idiosyncrasy.

Antiperiodics are drugs which relieve or cure certain diseases (particularly ague, and some forms of neuralgia and headache) whose attacks occur at regular intervals. The chief are cinchona and its alkaloids (especially quinine), and arsenic.

Antiphlogis'tic (Gr. *anti*, 'against,' and *phlogizō*, 'I burn'), a term applied to remedies and to regimen opposed to inflammation, such as bloodletting, purgatives, low diet, &c.

An'tiphon, the earliest of the ten Attic orators in the Alexandrine canon, born at Rhamnus in Attica, 480 B.C. He belonged to the oligarchical party at Athens, and to him, according to his pupil Thucydides, was mainly due the establishment of the government of the Four Hundred in 411 B.C. On its fall, a few months later, Antiphon was brought to trial and condemned to death, in spite of his noble defence. Only fifteen of his orations have come down to us, of which three were written for others, while the remainder appear to have been intended as specimens of school-rhetoric for his pupils. The best edition is by Blass (1881); see Jebb's *Attic Orators* (2d ed. 1903).

Antiph'ony, the name of a species of sacred song, sung by two parties, each responding to the other. Many of the Psalms show that antiphonal singing was in use in David's time. Its introduction into the Greek Church is ascribed to Ignatius, Bishop of Antioch, in the 2d century; and Ambrosius, Bishop of Milan, is said to have introduced it into the Western Church, in the 4th century. The chanting of the Psalms in the English cathedral service is an imitation of the ancient antiphony.

Antip'odes, a word of Greek origin, signifying, literally, those who have their feet over against each other. Thus Trevisa, in 1398, says that 'in Ethiopia are the Antipodes, men that have their feet against our feet.' As applied in geography, the term means the inhabitants of any two opposite points of the globe, or, in other words, the dwellers at the opposite extremities of any diameter of the earth. From this primary relation there necessarily arise many secondary relations. Antipodes must be on one and the same meridional circle, separated from each other by half the circumference. Being on one and the same meridional circle, they must differ in longitude exactly 180°, with the exception of the poles themselves, as having no longitude at all; and being separated from each other by half the circumference, they must be equidistant from the equator in opposite directions. Take, as an example, London, in 51° 30′ N. lat., and 0° 5′ W. long. Its antipodes must be in 51° 30′ S. lat., and in 180° 5′ W. long., or rather 179° 55′ E.—coinciding pretty nearly with Antipodes Island (49° 48′ S.; 178° 20′ E.), an uninhabited rocky islet, about 5 miles long, with smaller rocks around it, lying to the south-east of New Zealand.

Between antipodes in general there necessarily exist also other secondary relations. With reference to the earth's daily rotation, the noon of the one side must be the midnight of the other; while, with regard to its annual revolution, the summer and the autumn of the one side must be the winter and the spring of the other. The midnight corresponds to the noon on the other side, either of the day before or the day after, according as one has reached the antipodes sailing from the east or from the west. In going eastward—that is, in meeting the sun—one, from day to day, anticipates every noon and every midnight in the proportion of 4′ of time to 1° of long., or of 12 hours of time to 180° of long. In going westward, again, one postpones every noon and every midnight in the same proportion.

Antipope, a pontiff elected in opposition to one canonically chosen. The first antipopes were Felix, during the pontificate of Liberius (352–366); Ursinus, against Damasus (366–384); and Laurentius, against Symmachus (498–514). During the middle ages several emperors of Germany set up popes against those whom the Romans had elected without consulting them. Otho the Great displaced successively two Bishops of Rome; and when the rival pope, Sylvester III., had expelled the simoniacal and profligate Benedict IX. (1033–45), the latter was brought back by the German king, and soon afterwards sold his dignity to Gregory VI. There were now, consequently, three popes, but their claims were all set aside at a council convened at Sutri by the emperor, Henry III., and a new pope elected as Clement II. in 1046. Shortly after, Pope Alexander II. found a rival in Honorius II., the nominee of the emperor; but his claim was ratified by a council convened at Mantua. In 1080 the same unseemly spectacle was witnessed, when the emperor, Henry IV., elevated to the papal chair Guibert of Ravenna, under the title of Clement III., in opposition to his own implacable adversary, Gregory VII. But after the death of Gregory (1085), Clement was himself opposed successively by Victor III. (1086–88) and Urban II. (1088–99). Innocent II. (1130–43) triumphed over the antipope Anacletus II. by the help of St Bernard; and Alexander III. during his pontificate (1159–81) had to contend with no fewer than four successive antipopes, the election of only one of whom, however, Victor V., in 1159, has any canonical validity. After a long contest, Clement V. was elected in 1305, and four years later he transferred his seat to Avignon, where his successors reigned for nearly seventy years, losing the while,

by their subjection to French influences, the sympathies of Germany and England. The election of Urban VI. in 1378 occasioned 'the great schism of the West,' which divided the church for fifty years. He was elected by the Romans, who demanded an Italian pope after the death of Gregory XI. The French cardinals, then a majority in the curia, on the plea that they had elected the pope only under intimidation, withdrew to Provence, and elected a new pope under the name of Clement VII., who was recognised by France, Spain, Savoy, and Scotland; whilst Italy, Germany, England, and the whole north of Europe, supported Urban VI. For thirty-eight years Christian Europe was scandalised by the spectacle of two popes, one at Avignon, another at Rome, in turn hurling the most awful anathemas of the church at each other, like 'two dogs snarling over a bone,' in Wyclif's phrase. At the beginning of the 15th century, an attempt was made to prevail on both the rivals, Gregory XII. at Rome, and Benedict XIII. at Avignon, to renounce their claims with a view to promote union, but both evaded this as long as possible. At length the cardinals of both sides summoned a general council at Pisa in 1409, which deposed both popes, and elected Alexander V. The council of Constance (1417) deposed the *three* who now claimed actually to be pope, and laid the schism by electing Martin V. (Colonna). The council of Basel (1431–47), in its struggle with Pope Eugenius IV. (1431–47) for supremacy, attempted to arrogate to itself the papal functions, and proceeded to elect Amadeus of Savoy pope, as Felix V. The attempt, however, failed; the popes Eugenius IV. and Nicholas V. (1447–55) secured their authority, the ambitious council finally dissolved itself, and Felix V. resigned his empty dignity, and was raised to the rank of cardinal by the magnanimous pope himself. This was the last occasion on which the faithful were distracted by the sight of a rival pontiff within Christendom. See POPE.

Antipyrin is obtained from coal-tar products by a process of great complexity, its chemical composition being $C_{11}H_{12}N_2O$. It is a white crystalline powder, colourless, and soluble in water, and has a slight bitter taste. It is a prompt and usually efficacious antipyretic, lowering the febrile temperature in about half-an-hour, with effects reaching the maximum in from two to five hours, and lasting from five to eight hours. As an analgesic it is prompt and effective in reducing pain, especially in all kinds of neuralgia; for rheumatism it is also often very useful. But it is not an antiperiodic, and therefore cannot replace quinine in cases of ague or intermittent fevers. As with antifebrin, cases of poisoning are not infrequent, the symptoms being giddiness, convulsions, and a livid colour of the skin.

Antiquaria. See ANTEQUERA.

Antiquaries, Antiquities. See ARCHÆOLOGY, ACADEMY.

Anti-rentism, a term applied to the action of a political party which caused considerable disturbance in the state of New York (1843–47) in connection with the non-payment of rent. Large tracts of land had been granted in old colonial days by the Dutch West India Company to its members in New York, who had the title or privilege of a lord 'patroon' or protector, and the colony or manor was governed by feudal tenures. Though the latter were abolished by laws enacted in 1779 and 1785, yet the proprietors managed to form a deed by which rents and dues should be paid as formerly. Associations were formed in 1839 to get rid of these burdens; evictions were tried by the proprietors, which led to resistance and outrages. Ultimately the legislature gave relief of a certain kind to the tenantry, feudal tenures and incidents were abolished, and agricultural land was forbidden to be leased for a longer period than twelve years.

Antirrhinum. See SNAPDRAGON.

Antisana, a volcano of the Andes, in Ecuador, about 35 miles SE. of the town of Quito, 19,260 feet high. On its slopes are many extinct craters, and at a height of 12,400 feet, the famous Tambo de Antisana, one of the highest inhabited places in the world.

Antiscorbutics. See SCURVY.

Antisemites, the modern opponents of the Jews in Russia, Rumania, Hungary, Poland, and elsewhere. In these countries the Jews are found in great numbers, and their constantly increasing wealth and influence excite popular jealousy and alarm. The question how far it is advantageous for a country to allow excessive wealth and political power to pass into the hands of a race avowedly alien, and but little influenced by the sentiment of nationality, admits of discussion, but there can be no excuse for the brutal outrages upon innocent individuals that occurred in Russia and Hungary in the years 1881–84. Even in the enlightened capital of the German empire the *Judenhetze* raged hotly; and an Anti-Semitic League was formed in 1881 to restrict the liberty of Jews in Germany. The emperor interfered to stop the cowardly persecution, but not before thousands of Jews had left the country. The persecution in Russia assumed a more brutal character than in Germany, and thousands of Jews fled to America, Spain, and elsewhere; and a hideous outbreak took place at Kishineff in Bessarabia at Easter 1903. There were outbursts in Poland during the confusion attending the re-establishment of national independence. French Anti-Semitism was illustrated in the Dreyfus case. See JEWS.

Antiseptics are substances which prevent or arrest putrefaction and analogous fermentive changes. It has been proved that Putrefaction (q.v.), fermentation of grape-juice (*vinous fermentation*), of milk (*lactic fermentation*), and many, though probably not all, other fermentations, depend upon the presence of microscopic vegetable organisms (see BACTERIA, GERM). To prevent these processes, then, it is necessary either (1) to exclude these organisms altogether; (2) to interfere with conditions which permit of their development; or (3) to destroy their vitality.

(1) These organisms, or their germs, are present in ordinary air; but it has been shown by Pasteur, Tyndall, Lister, Roberts, and others, that if air be filtered through cotton wool, or (if moving slowly) through a fine bent tube, it may be allowed to come in contact with putrescible substances, if these themselves contain no living organisms or germs, without causing putrefaction. This method, however, has had no important applications except in scientific research.

(2) Their growth may be arrested (*a*) by a low temperature. Thus large quantities of fresh meat, fruit, and vegetables are imported from distant countries, in chambers cooled to near the freezing-point. Carcasses of the long-extinct mammoth, with the flesh still present, have been found in the ice-cliffs of Siberia. The longer time that meat, milk, &c. keep in cold than in hot weather is familiar. (*b*) By absence of moisture. Thus, if the contents of an egg be thrown out on a plate, and thoroughly dried in an oven, the whole becomes of a hard, horny consistence, and may be kept in this state for years. If soaked in water, it will soon begin to putrefy. In the same way meat may be kept fresh by thoroughly drying it. (The preservation of fruits, &c. in strong syrup is an example of a somewhat similar action.)

(3) The vitality of these organisms may be destroyed (*a*) by heat—e.g. meat and other eatables can be preserved for an indefinite time if they are boiled and hermetically sealed, while still hot, in tin vessels (see PRESERVED PROVISIONS; and for the pasteurisation of beer-bottles by heat, see BEER); (*b*) by means of various chemical substances. Some of the most important of these are common salt and saltpetre, used in curing fish, pickling meat, &c.; alcohol, in preserving zoological specimens, vegetable essences, fruits, &c.; sulphurous acid, boric acid, and arsenious acid; many salts, as chloride of zinc (Burnett's disinfecting liquid, q.v.), permanganate of potash (see under MANGANESE), corrosive sublimate, nitrate of silver; chlorine (given off by chloride of lime and from chlorine water), iodine, iodoform (CHI_3), glycerine, boroglyceride, eucalyptus oil, thymol, creasote, carbolic acid, salicylic acid, salol, naphthaline, camphor, oil of winter-green, oil of thyme, aluminium acetate, charcoal. All these substances act directly or indirectly as poisons to the organisms which produce putrefaction, &c.; most of them are either poisonous or very unpalatable to man, and cannot therefore be used in preserving food. Many of them are, however, used in the arts to arrest the decomposition of putrescible substances—e.g. in the manufacture of size for writing-paper from scraps of hides, sulphite of soda, containing sulphurous acid, is added; hides are preserved by salt, or, when tanned, by tannin, a compound of tannic acid; and timber is found less liable to decay if charged with an antiseptic, such as sulphate of copper, chloride of zinc, corrosive sublimate, or creasote. The timber is placed in a steam-box, so that the air contained in its pores is displaced by steam; the whole casing is then closed tight, and allowed to cool; the steam condenses and leaves a vacuum in and around the wood. If one of these substances is then introduced, it finds its way into the innermost pores of the timber (see TIMBER).

In brewing, bisulphite of lime is used as an antiseptic. Several of the above-named antiseptics have been largely used in the preservation of food. Salicylic acid, boric acid, borax and boric acid, formalin, and acid sulphites have been employed for preserving beer, butter, fruits, &c. A committee of the Board of Agriculture in 1901 made the following recommendations as to their use in foods:

(1) To prohibit formaldehyde or formalin entirely.

(2) To limit the quantity of salicylic acid to one grain per pint or pound of food.

(3) To prohibit preservative in milk.

(4) That there be not more than one-quarter per cent. of boric acid preservative added to cream.

(5) That the same preservatives be allowed for butter, but not more than one part in two hundred.

(6) To prohibit preservatives in infants' and invalids' foods or drinks.

(7) To prohibit the use of copper in preserved foods.

These recommendations, not followed at the time, have since been enforced, but there is still much difference of opinion regarding preservatives in food.

Next to the preservation of food, the most important purposes for which antiseptic methods and substances are used, are the *prevention of infectious diseases*, and the *treatment of wounds*. The properties of the infectious matter of infectious diseases are closely analogous to those of the organisms that lead to putrefaction, &c.; and even in cases where its organic nature has not been proved (see GERM), it can be rendered inert by a proper use of antiseptics, or by exposure to a high temperature. Thus, anything that has come near the patient suffering from an infectious disease, and discharges from his person, are made harmless by carbolic acid, chloride of zinc, or some other antiseptic; his bedding is roasted in an oven at a temperature of 212° F. (100° C.), or more; the room where he has been treated is fumigated with chlorine or sulphurous acid; and so the disease is prevented from spreading. This is, in fact, one of the chief aims of medical practice at the present day (see DISINFECTANTS).

Many of the evil effects which follow wounds and surgical operations are due to the presence of organisms (see PYÆMIA); and the effects of their antiseptic treatment, introduced by Lister, have been marvellous.

Antiseptic or Aseptic Surgery is the system of treating surgical wounds introduced by Lord Lister (q.v.), based on his clear recognition of the fact that the putrefactive process (*sepsis*) is the chief danger which the surgeon has to combat in dealing with accidental and operation wounds. The system consists essentially in excluding those microbes by which fermentative processes are induced, or in eradicating them from wounds to which they have gained access. In this way pyæmia, septicæmia, and such other forms of wound poisoning as erysipelas and gangrene, once the scourge of surgical hospitals, have in a short period of years become diseases of rare occurrence, and the reduction in hospital mortality has been very great. Carbolic acid dissolved in various menstrua, in the form of a steam spray, or impregnated in gauze or cotton-wool, was till recently the favourite antiseptic in surgical practice. Thymol, eucalyptus oil, boric and salicylic acids, and iodoform, are also in frequent use for the same purposes. In 1881 Professor Koch of Berlin drew attention to the much greater potency of perchloride of mercury (corrosive sublimate) as compared with other antiseptics, and his suggestion of its employment in a one *pro mille* aqueous solution was erelong all but universally adopted with satisfactory results. Along with carbolic acid, which is still preferred for some parts of the method, this antiseptic is employed in destroying the infective particles or *germs* in the immediate neighbourhood of the wound. The wound itself is only treated with the germicide solution when the presence of germs within it is suspected, otherwise it is kept free from the irritative action of the lotion; but all objects approaching it must be rigorously purified by previous boiling; all instruments, sponges, or absorbent swape must be boiled, and the surgeon's hands and clothing strictly sterilised.

Method of Operating and of Dressing Operation-wounds.—The skin of the part, the hands of the operator and his assistants, and the instruments are carefully purified with a watery solution (1 in 1000) of corrosive sublimate. Sponges, ligatures, and drainage-tubes are kept in carbolic acid solutions. The wound and its neighbourhood are frequently irrigated by boiled water during the continuance of the operation. When the operation is completed and the wound closed, it is covered with a layer of specially prepared oil-silk (protective), to prevent constant irritation by the antiseptic in the dressing. This consists of muslin impregnated with bicyanide of mercury ('Lister's gauze'), so that the dressing remains in an actively antiseptic condition for some days till replaced by a new dressing, and thus prevents contamination of discharges from the wound. The first layer is wetted in carbolic acid solution (1 to 40) to destroy any germs adhering to its surface, and renders it actively antiseptic at once. The remainder is applied dry, in order to soak up the discharge as it flows from the wound. This dry dressing may be in part or wholly replaced by fine cotton wadding impregnated with salicylic acid, 4 per cent., its elasticity rendering it a more comfortable application, and permitting its close adaptation to the

hollows and prominences of joints, and to the contours of the body generally. The whole is fixed by bandages. The dressing is in general not changed till discharge becomes visible through it. When it is changed, similar precautions with regard to purification of hands, instruments, &c. must be observed.

Treatment of Wounds not inflicted by the Surgeon.—They are washed out with a searching antiseptic solution, as watery solution of corrosive sublimate (1 in 500) or carbolic acid (1 in 20), and are thus at once thoroughly disinfected. They are then treated like operation-wounds. After forty-eight hours at furthest, if the wound is irritating or inflammatory, further treatment is needed. If that is so, the original disinfection must be repeated.

Results.—If this treatment is thoroughly carried out: (1) no bacteria and no putrid smell are present in the discharge; (2) no pyæmia, septicæmia, hospital gangrene, or erysipelas results; and in general (3) no formation of pus takes place; (4) no pain is felt in the wound; (5) no fever follows.

Some of the most striking effects of this method on surgical practice are: (1) In many cases of injury, especially compound fractures and dislocations, a limb may now be preserved where amputation was formerly considered necessary. (2) Many operations are now fearlessly and safely performed, which formerly were either not attempted, or were frequently followed by disastrous results; especially operations on bones and joints, and opening of Chronic Abscesses, and Serous Membranes (q.v.). (3) Mortality from injuries and operations has been greatly diminished—e.g. the death-rate after major amputations (in 1864 and 1866) fell from 45 per cent. to 15 per cent. (1867–69) in Lister's wards in Glasgow after he introduced his method, and to about 12 per cent. (in 1871–77) in Edinburgh, when he had further developed it. Volkmann of Halle was on the point of closing his wards in consequence of the prevalence of pyæmia and septicæmia. He tried Lister's method, and during the next five years the total mortality in his wards was less than 6 per cent. The tendency of late is, instead of antiseptic treatment, involving the disinfection of the wound with chemicals, to rely on *Aseptic* methods—sterilising instruments, clothes, hands and skin to be operated on beforehand. See SURGERY, WOUNDS.

Antispasmodics. See SPASM.

Antis'thenes, founder of the Cynic school of philosophy, was the son of an Athenian father and a Thracian mother. He fought in his youth at Tanagra (426 B.C.), was first a disciple of Gorgias, afterwards a friend and follower of Socrates, and died at Athens at the age of 70. After the death of Socrates, he taught moral and practical philosophy in the Athenian gymnasium Cynosarges, from which it is said his school derived its title. Antisthenes held that virtue mainly consists in voluntary abstinence from pleasure, and in a stern contempt of riches, honours, and even learning. He showed his contempt for all the luxuries and comforts of life by eating the hardest fare and wearing ragged garments—an eccentricity which Socrates reproved with the words, 'I see your pride through the holes in your cloak.' Antisthenes attracted many imitators, among them Diogenes; and from his school possibly the Stoics sprung. His writings have mostly perished. See CYNICS, SOCRATES and books there cited, and STOICISM.

Antithesis (Gr. *anti*, 'against,' and *thesis*, from *tithēmi*, 'I place'), an opposition or contrast of ideas expressed by bringing words that are the natural opposites of each other close together so as to produce a strong contrast. Thus Lessing, in a criticism on a book, says: 'It contains many good things and many new; but the good are not new, and the new are not good.' Antithesis, when naturally and moderately employed, gives liveliness to style; but, like all strong figures of speech, becomes wearisome when too often repeated, as it is in the sonorous prose of Dr Johnson.

Antitoxin, the name for substances present in the blood of an animal which have the effect of neutralising the action of bacterial poisons (toxins). As in the case of toxins, so with antitoxins—their chemical nature is not definitely known. See the articles BACTERIA, DIPHTHERIA, GERM, PTOMAINE, PYÆMIA, TUBERCLE, TUBERCULOSIS.

Antitrinitarians. See UNITARIANS, TRINITY.

Antitype, the person in whom any prophetic type is fulfilled. See TYPE (Theology).

Antium, one of the most ancient cities of Latium, built on a rocky promontory running out into the sea. Being favourably situated for commerce and piracy, it became, under the Volscians, one of the most powerful enemies of rising Rome. Conquered in 468 B.C., it soon revolted, and long maintained its independence, but was at length subdued in 338 B.C. It was deprived of all its ships, the beaks of which (*rostra*) were carried off to ornament the platform of the speakers in the Roman forum. It became a favourite resort of the wealthy Romans, and some of the most famous remains of ancient art have been discovered among the ruins of their villas and palaces; such as the Apollo Belvedere, and the Borghese Gladiator. It was the birthplace of the Emperors Caligula and Nero.

Antiva'ri (Serb. *Bar*), an Adriatic seaport (formerly Albanian) assigned to Montenegro (q.v.) by the Treaty of Berlin in 1878. A railway runs N. (12 miles) to Vir Pazar on Lake Scutari. A Roman Catholic archbishop has his seat there. It has an old citadel, and a small harbour. Blockaded by an international squadron in 1913, it was occupied by Austria in 1916–18. Pop. 2500.

Antlers, bony outgrowths from the frontal bones of almost all the members of the deer family. Except in the reindeer, they are restricted to the males, and are secondary sexual characters used as weapons in fighting for possession of the females. They appear as a pair of knobs covered with dark skin, from which the bony tissue is developed. In the year after that of birth, the antlers remain unbranched conical 'beams.' In the following spring, the previous growth having been meanwhile shed, the antlers grow to a larger size, and form their first branch or 'brow.' Year by year the number of branches or 'tines' increases, and more than sixty have been counted on some magnificent heads. The soft hairy skin which secures their rapid annual growth is known as the 'velvet,' and its accidental injury affects the development of the antlers. Growth ceases when the blood-supply is cut off by the development of a tubercled burr at the base, and the deer then rub off the dry skin and leave the bone bare. The antlers are shed, in many cases at least, annually, after the breeding period. The various types of antlers are used as convenient characters in distinguishing the different genera. Investigation of fossil forms has shown that the gradual development of antlers exhibited in the individual life of the deer is a recapitulation of their progressive historic evolution. See HORN, DEER, RED DEER, SEXUAL SELECTION, WAPITI.

Ant-lion, the larva of an insect (*Myrmeleon*) of the order Neuroptera, remarkable for the ingenuity of its insect-catching habits. It inhabits sandy districts, is not known in Britain, and is

more common in the south of Europe than in the north. Some species are common in North America. The perfect insect is about an inch long, and has a general resemblance to a dragon-fly. The grayish-yellow larva is rather more than half an inch long; it has a stout hairy abdomen, and a small head, which is furnished, however, with two very large incurved mandibles. It has six legs, but is incapable of rapid locomotion, and generally jerks itself backwards. It feeds upon the juices of insects, especially ants, in order to obtain which it cleverly excavates a funnel-shaped pitfall in sandy ground, and lies in wait at the bottom, often with all but its mandibles buried in the sand. When insects approach too near to the edge of the hole, the loose sand gives way, so that they fall down the steep slope. If they do not fall quite to the bottom, but begin to scramble up again, the ant-lion throws sand upon them by jerking its head,

Ant-lion, showing perfect insect, larva, and excavation.

and thus brings them back. It employs its head in the same way to eject their bodies from its pit, after their juices have been sucked, and casts them to a considerable distance; and by the same means throws away the sand in excavating its hole, first ploughing it up with its body, and then placing it upon its head by means of one of its fore-legs. It always begins by working round the circumference of its future hole, and gradually narrows and deepens it; turning quite round after each time that it works round the hole, so as to employ next time the fore-leg of the other side. When it meets with a stone which it cannot remove, it deserts the excavation and begins another. The pit is rather more than two inches deep. After about two years the larva spins its cocoon. The habit is seen at a lower stage of evolution in some species which simply bury themselves in the sand without making any pitfall.—The name of Ant-lion (*Myrmekoleon*) was long given to a fabulous beast, supposed to be the offspring of a lion and a female ant, and participating in the form and qualities of both parents.

Antofagasta, a port in the like-named province in north Chile (area, 46,400 sq. m.; pop. 172,000). Founded in 1870, the town owes its rapid rise to neighbouring saltpetre deposits, to the rich mines of Caracoles, and to its trans-Andine railway connection with Bolivia. It was taken from Bolivia in the war of 1879. Pop. 50,000. See ATACAMA.

Antommarchi, FRANCESCO, the physician of Napoleon at St Helena, was also a native of Corsica, and was born about 1780. He was already an anatomist of some celebrity at Florence, when he was induced in 1818 to go to St Helena. Napoleon received him with mistrust, but ultimately gave him his full confidence, and at his death left him 100,000 francs. After his return to Europe, he published at Paris his famous but scarcely trustworthy book, *Les Derniers Moments de Napoléon* (1823). During the Polish revolution, he did duty at Warsaw as director of military hospitals. He afterwards went to the West Indies, and died in Cuba, on the 3d of April 1838.

Antonelli, GIACOMO, cardinal, was born 2d April 1806, at Sonnino, a village situated near the Pontine Marshes. His father was a woodcutter, member of an ancient but decayed family. In 1819 his birthplace having been demolished as a nest of robbers, Antonelli came to Rome, and entered the Grand Seminary, where he proved himself one of the cleverest students of his time. He gained the favour of Pope Gregory XVI., who named him a *prelato*, and gave him some excellent ecclesiastical appointments. In 1841 Antonelli became under-secretary of state to the ministry of the interior; in 1844, second treasurer; and in the following year, finance minister of the two apostolic chambers. Pope Pius IX., having mounted the papal throne in 1846, raised Antonelli, during the next year, to the dignity of cardinal-deacon of Santa Agatha alla Suburra. In 1848 Antonelli was president and minister of foreign affairs in a liberal cabinet, which framed the famous *Statuto* or Constitution proclaimed in 1848, the principal articles of which were so very soon eluded. He accompanied the pope in his flight to Gaeta, and returned with him to Rome, and supported the reactionary policy. In 1855 an attempt was made upon his life. In the Vatican Council of 1869–70, Antonelli showed great tact and ability. He obstinately resisted all concessions to the growing national spirit of the Italian people; but his protestations against the progress of events in Italy were of no avail, and Victor-Emmanuel entered Rome in 1871. At the date of his death, 6th November 1876, the various posts held by Antonelli made him virtually prime-minister to the pope (see PIUS IX.). The great property bequeathed by him to his three brothers was vainly disputed by the Countess Lambertini, claiming to be his daughter, in a tedious and famous lawsuit (1877–79).

Antonello OF MESSINA, an Italian painter, born about 1414, who introduced into Italy the Flemish methods of oil-painting, which he had learned from the Van Eycks. He settled about 1473 in Venice, where he gained great renown as a portrait-painter, and died probably in 1493. His chief extant works are a Crucifixion at Antwerp, and a portrait in the Louvre, both of 1475, another portrait in Berlin, of 1478, and a St Sebastian at Dresden.

Antoni'nus, M. AURELIUS. See AURELIUS.

Antoninus, ITINERARY OF. See ITINERARY.

Antoninus Pius, TITUS AURELIUS FULVUS, Roman emperor (138–161 A.D.), was born in the reign of Domitian, in the year 86 A.D. His family came originally from Nemausus, now Nîmes, in Gaul. Antoninus inherited great wealth, and early gave proof of excellent qualities. In 120 he was made consul; afterwards he was sent by Hadrian as proconsul into Asia, where the wisdom and gentleness of his rule won for him a higher reputation than had been enjoyed by any of his predecessors. In 138 he was adopted by the Emperor Hadrian, in consequence of his merit alone, and came to the throne in the same year. His reign was proverbially peaceful and happy. In his private character he was simple, temperate, and benevolent; while in public affairs he acted as the father of his people. The persecution of Christians, which was continued

during his reign, was partly stayed by his mild measures, and Justin Martyr's *Apologia* was received by him with favour. Under Antoninus the empire was little engaged in war, except in Britain, where the power of Rome was extended, and a wall built between the Forth and the Clyde against invasion from the north. 'Happy the nation which has no history.' The reign of Antoninus illustrates this saying, for by his justice, wisdom, kindliness, and courtesy his vast empire was preserved from the crimes, conspiracies, insurrections, and bloodshed, the record of which forms the bulk of the history of the dark centuries of the Roman empire. It is said that only one senator was impeached during the entire reign. Literature received great encouragement; the laws were improved; commerce extended; the means of communication were facilitated by the repair of roads and bridges; new sanitary regulations were introduced; and a taste for architecture fostered in the citizens. The epithet *Pius* was conferred on him on account of his conduct in defending the memory of his predecessor Hadrian against certain dishonouring measures brought forward by the senate. Antoninus died in 161 A.D. By his wife Faustina, whom he loved in spite of her unworthiness, he had four children, three of whom died, but one lived to be the wife of Marcus Aurelius, his adopted son and successor.

The Wall of Antoninus is a Roman rampart erected between the Firths of Forth and Clyde, in 140–142 A.D., during the reign of Antoninus Pius, to restrain the encroachments of the northern tribes; the superintendence of the work is credited to the imperial legate, Q. Lollius Urbicus. Following the earlier line of Agricola's forts (81 A.D.), it extended some 30 or 40 miles; the eastern termination being at Bridgeness in Carriden (in Gildas, *Caer Eden*), on the Forth, while the western had generally been held to be at or near Old Kilpatrick, and there Sir George Macdonald discovered the actual terminus. It had been thought by some that the wall extended right up to Dumbarton Rock (*Alcluith*). The work consisted of a ditch about 20 feet deep and 40 wide, a rampart of sods on a foundation of stones, about 20 feet high and 15 feet thick at the base, and on the south side a paved military road, with a chain of forts. The most perfect fragments of the *vallum*, popularly known as *Graham's* or *Grime's Dyke*, are perhaps those near Castlecary; within the park of Callendar; and on a slope near Polmont railway station. Extensive and important excavations have been made since 1900 at various parts of the wall, including the fortified stations at Camelon and Roughcastle near Falkirk, at Castlecary, and at Barr Hill near Croy, where the foundations of one of Agricola's forts were discovered underneath the remains of the Antonine fort. There are several Graham's or Grime's Dykes in the Northumbrian borders—*Gryme* or *Grim* being 'giant,' or popularly 'the devil;' and there is a Gryme's Dyke ('ditch' or 'embankment') in Oxfordshire. See 'The Antonine Wall Report' of the Glasgow Archæological Society (1900); the *Proceedings* of the Scottish Society of Antiquaries; G. Macdonald, *The Roman Wall in Scotland* (1912); G. Macdonald in *Jnl. of Roman Studies*, xi. pt. i. (1921).—For the emperor, see Lacour-Gayet, *Antonin le Pieux* (1888); E. C. Bryant, *The Reign of Antoninus Pius* (1894). The Pillar of Antoninus at Rome was raised in honour of Marcus Aurelius, after his victory over the Marcomanni. On coins and inscriptions the emperor Caracalla (q.v.) was called (like Aurelius, q.v.) M. Aurelius Antoninus.

Antonius, MARCUS (in English more familiar as MARK ANTONY), the great Roman triumvir, who was born about 83 B.C., belonged to one of the oldest patrician families, and on his mother's side was related to Julius Cæsar. His youth was wasted in dissipation, and finding himself pressed by creditors, he escaped to Greece in 58 B.C., where, for a while, he listened to the Athenian philosophers and orators. His studies here were soon interrupted by the proconsul Gabinius, who appointed him commander of his cavalry. In the campaign against Aristobulus in Palestine, and in Egypt, Antony distinguished himself by his courage and activity, and ingratiated himself with the soldiery. After assisting Cæsar in Gaul, he went to Rome in 50 B.C., to uphold his great kinsman against the oligarchical party, and was appointed quæstor, augur, and tribune of the plebs. Next year, as one of Cæsar's adherents, he was expelled from the curia, and fled to Cæsar, who made this a pretext for his war against Pompey. At its outbreak, Antony received the appointment of commander-in-chief in Italy; in the battle of Pharsalia, he led the left wing of Cæsar's army. In 47 B.C. he was made master of the horse by Cæsar, who left him to govern Italy during his absence in Africa. Antony, as usual, disgraced himself. He drank; he divorced his wife, and took up with an actress, Cytheris. In 44 B.C. he was made consul, and vainly endeavoured to prevail on the Romans to recognise Cæsar as emperor. On Cæsar's assassination, he played the part so finely described by Shakespeare; and by his funeral oration, with the well-timed display of Cæsar's bloody robe, so wrought on the passions of the people, that the conspirators were forced to escape from Rome, leaving Antony in possession of almost absolute power. Next, we find him occupied in disputes and reconciliations with Octavian (see AUGUSTUS), besieging Mutina, and denounced by Cicero as an enemy of the state. The defeat of Mutina (43 B.C.) drove him a fugitive beyond the Alps; but in Gaul he visited the camp of Lepidus, and gained the favour of the army, of which he took the command. Plancus and Pollio joined him with their troops; and Antony, who so recently had escaped as a helpless fugitive from Italy, returned to Rome at the head of seventeen legions and 10,000 cavalry. Octavian, who had pretended to maintain republican principles, now threw off the mask, and held a consultation with Antony and Lepidus, near Bononia, when it was determined that these triumvirs should share the whole Roman world among themselves. To secure their spoil, they returned to Rome, and began their course of proscription and plunder. Among their first victims was Cicero, the orator whose eloquence they dreaded; and, in all, not less than 300 senators and 2000 *equites* are believed to have fallen. After securing Italy for themselves, and raising an enormous sum of money to carry on the war abroad, Antony and Octavian led their troops into Macedonia, and defeated Brutus and Cassius. Antony next paid a visit to Athens, and then passed over to Asia, to arrange his dispute with Cleopatra, queen of Egypt, whose conduct had offended the triumvirs. The queen herself appeared to answer his challenge, and captivated him by her beauty and address. The conqueror of Brutus and Cassius was made a prisoner, though not a prisoner of war. He followed Cleopatra into Egypt, and lived with her in idleness and luxury, until he was aroused by tidings of a quarrel in Italy between his own kindred and Octavian. This dispute gave rise to a short war, which came to an end before Antony arrived in Italy. A new division of the Roman world was now arranged, Antony taking the East, and Octavian the West, while Lepidus had to put up with Africa. Antony had confirmed his friendship with Octavian by a marriage with his sister, Octavia; but, returning now to

Cleopatra, he resumed his voluptuous mode of life, and was guilty of acts of the grossest injustice. Octavian used these facts to excite the indignation of the Roman people against Antony, and war between the rivals became inevitable. Antony, in his idleness, tried to postpone the coming conflict, and filled the island of Samos (where his troops were quartered) with musicians, jugglers, and buffoons. Meanwhile, at Rome, he was deposed from the triumvirate, and war was proclaimed against Cleopatra. Each party collected its forces, and in the naval engagement of Actium (31 B.C.) Antony was defeated. His hope of finding troops still faithful to him in Libya was disappointed; and he returned to Egypt, there, with Cleopatra, once more to forget his political cares and vexations, until his amusements were suddenly interrupted by the arrival of Octavian at Alexandria. Deserted by the Egyptian fleet, as by his own army, and deceived by a false report of Cleopatra's suicide, he killed himself by falling upon his sword, in the year 30 B.C.

Antony, ST, surnamed THE GREAT, or ANTONY OF THEBES, the father of monachism, was born about the year 251 A.D., at Koma, near Heraklea, in Upper Egypt. His parents were both wealthy and pious, and bestowed on him a religious education. Having sold his possessions, and distributed the proceeds among the poor, he withdrew into the wilderness, where he disciplined himself in all those austerities which have hallowed his memory in the Catholic Church, and made him the model of monastic life. When 30 years of age, he penetrated farther into the desert, and took up his abode in an old ruin on the top of a hill, where he spent twenty years in the most rigorous seclusion; but, in 305 he was persuaded to leave this retreat by the prayers of numerous anchorites, who wished to live under his direction. He now founded a monastery, at first only a group of separate and scattered cells near Memphis and Arsinoë, which, nevertheless, may be considered the origin of cenobite life. After a visit to Alexandria in 311, he returned to his lonely ruin. In 355 the venerable hermit, then over a hundred years old, made a journey to Alexandria to dispute with the Arians; but feeling his end approaching, he retired to his desert home, where he died, 356 A.D. Athanasius wrote his Life. His festival is kept on the 17th January. See MONACHISM, PACHOMIUS.

ST ANTONY'S FIRE was the name given to a pestilential epidemic, also called the *sacred fire*, which in 1089 swept off great numbers, especially in France; it being held that many sufferers had been cured through the intercession of St Antony, especially by prayer before his relics. The disease was commonly supposed to be erysipelas, which usurped the name of St Antony's Fire; but possibly it was a form of Raphania (q.v.), caused by eating ergot of wheat or rye. The Hospital Brothers of St Antony, then founded, wore a black habit with a blue Tau-cross (St Antony's Cross). See EPIDEMICS.

Antony OF PADUA, ST, was born at Lisbon, August 15, 1195, and on the father's side was related to Godfrey of Bouillon. He was at first an Augustinian monk; but in 1220 he entered the Franciscan order, and became one of its most active propagators. He preached in the south of France and Upper Italy, and died at Padua, June 13, 1231. He was canonised by Gregory IX. in the following year. He himself practised the most severe asceticism, and opposed vigorously the movement for mitigating the severity of the Franciscan rule led by Elias of Cortona. According to legend, he preached to the fishes when men refused to hear him; hence he is the patron of the lower animals, and is often represented as accompanied by a pig. His monument, a fine work of statuary, is in the church which bears his name at Padua. Devotion to him has recently been greatly extended in France and other countries.

See *The Chronicle of St Antony of Padua*, by Father Coleridge, S.J. (1883); *St Antony of Padua*, by Lepitre (trans. 1902).

Antraigues, EMANUEL DELAUNAY, COMTE D', was born at Villeneuve, Ardèche, in 1755. His *Mémoires sur les États-généraux* (1788) promoted the French Revolution; but in 1789, when he was chosen as a deputy, he defended the privileges of the hereditary aristocracy, ranked himself with those who opposed the union of the three estates, and maintained that the royal veto was an indispensable part of good government. After leaving the Assembly in 1790, he was employed in diplomacy at St Petersburg and Vienna, where he defended the cause of the Bourbons. In 1803 he was employed under Alexander of Russia in an embassy to Dresden, where he wrote against Bonaparte a brochure, *Fragment du XVIII. Livre de Polybe.* He came to England, and acquired great influence with Canning. On July 22, 1812, he was murdered, with his wife, at his residence near London, by an Italian servant. See L. Pingaud, *Un Agent Secret* (1893).

Antrim, a maritime county in the NE. of Ireland, province of Ulster, stands (since 1891) first among the Irish counties in population, but in size only ninth. Its greatest length is 57 miles; its greatest breadth, 28; its extent of sea-coast, 90; and its area, 1192 sq. m. Of this, rather more than three-fourths is in tillage and pasture; and one per cent. under wood. Off the north coast lie Rathlin Isle and the Skerries; and off the east coast, the Maiden Rocks. The east coast is hilly; and from Larne to Fair Head, parallel mountain-ranges of no great height, and covering a third of the county, stretch SW. into the interior, forming valleys opening seaward, called the Glens of Antrim. The interior slopes towards Lough Neagh. The highest eminences are—Trostan, 1810 feet; and Slievemish, or Slemish, 1782. The principal streams are—the Bann, from Lough Neagh to the Atlantic; the Main, running parallel to the Bann, but in the reverse direction, into Lough Neagh; and the Bush, flowing north into the Atlantic. Many peat-bogs occur in the county. Six-sevenths of the surface consists of igneous rocks (trachyte-porphyry and basalt-rock), often alternating with bands of a red clay or *bole*, and overlying cretaceous and jurassic strata, new red sandstone, and metamorphic rocks. The basalt-rocks, or old lava-flows, have frequently a columnar structure. Between Ballycastle and the mouth of the Bann, the basalt assumes very picturesque forms; and the Giants' Causeway (q.v.) is one of the most perfect examples of columnar basalt in the world. Fine salt-mines occur at Duncrue and Carrickfergus; and small coal-fields near Ballycastle and in the interior. Rich beds of iron ore of fine quality have been recently opened in Glenravel, and a large export has been carried on from Cushendall and Carnlough. The soil of Antrim is mostly light, and the chief crop is oats. The land is very much subdivided. Agriculture (including flax-growing), linen, cotton, and coarse woollen manufacture are the staple industries. Principal towns —Belfast, Lisburn, Carrickfergus, Ballymena, Larne, Ballymoney, and Portrush; Antrim, 1 mile from the NE. corner of Lough Neagh, has a pop. of 2000. County Antrim returns two members; Belfast borough, four. Pop. (1926) 606,625; or, without Belfast, 191,618, about half Presbyterians, one-fifth Catholics, one-fifth Protestant Episcopalians. The large number of Presbyterians

is due to the fact that the county was extensively colonised from England and Scotland. The original possessors were the O'Neills, who, in 1333, regained the whole country, except Carrickfergus and part of the Glens—held by the Bissets of Glenarm. The forfeiture of Shane O'Neill, in the reign of Elizabeth, terminated the dominion of his race.

Ant-thrush, a general name for long-legged, thrush-like, but often brilliant birds of the Passerine family Pittidæ, chiefly natives of Oriental and Australian regions. They usually frequent thick jungle and scrub, and keep for the most part to the ground, hopping very quickly, and searching for molluscs, insects, and worms among the fallen leaves. Somewhat similar in habit are the shy 'Ant-birds' of South America, the Formicariidæ, which are said to feed not on ants, but on the insects which the foraging ants disturb.

Antwerp (Fr. *Anvers;* Flem. *Antwerpen,* 'on the wharf'), the capital of the province which bears its name, the chief commercial city of Belgium, and one of the greatest seaports in the world, is situated on the river Scheldt, 52 miles from the sea, and 27 N. of Brussels. The tonnage of vessels entering the port of the 'Liverpool of the Continent' increased from 240,000 in 1850 to over 14,000,000 tons in 1913, when 7056 vessels entered the port, not counting 44,000 (of over 3,500,000 tons capacity) which arrived by canal from the interior of Belgium, Holland, Germany, and France. The port becoming congested through rapid growth of traffic, a great extension scheme was sanctioned in 1906, and modified in 1913. By 1914 two new basins were completed, with over 6000 yards of quays. Among other improvements provided for are rectification of the river-bed, construction of new river quays, besides a large canal basin and four subsidiary basins. Antwerp has regular passenger services with Harwich (daily), New York (weekly), and other ports. The imports include all the products in common use amongst an industrial and commercial community. The chief exports are flax, sugar, iron, woollen goods, metals, glass, and tallow. The manufactures consist chiefly of sugar, white-lead, cotton goods, lace, linen-thread, sewing-silk, black silk stuffs, starch, petroleum, and printers' ink. There are also tobacco manufacture, the cutting of diamonds and other precious stones, and shipbuilding. The chief public institutions are the Academy of Sciences, the Royal Academy of Fine Arts, the Colonial University (1923), Naval Arsenal, Museum of Fine Arts (rich in Flemish masters), Zoological Gardens, the Flemish theatres, and the Plantin Museum (1876), and excellently preserved 16th century printing-house. The six-aisled cathedral (1352–1518), the noblest Gothic structure in Belgium, is 384 feet in length by 250 in breadth, with a roof supported by 125 pillars, and an exquisite spire, 403 feet high, in which hangs a splendid carillon of 99 bells. The interior is enriched by three masterpieces of Rubens, including the Elevation of and the Descent from the Cross. In the image-breaking riot of 1566 by the populace of Antwerp, the cathedral and its art treasures suffered severely. A beautiful wrought-iron canopy by Matsys covers a well outside. The cathedral and old quarters of Antwerp adjoin the square called Place Verte. The Church of St James contains the tombs of the Rubens family. Other noteworthy churches are St Paul's, St Andrew's, St Augustine's, and St Charles Borromeo's. The Exchange (1531), a fine building, is said to have been Gresham's model of the old London Exchange. It was burnt in 1858, but rebuilt in the same style (1872). The hôtel-de-ville (1565), on the Grand' Place, is a fine building in Renaissance style. The Grand' Place contains the Brabo Fountain by Jef Lambeaux. Near the handsome Central Station are found the fashionable shopping avenues. The old fortifications were demolished in 1860, though Alva's famous citadel (1567) stood till 1874. Antwerp, one of the most strongly fortified places in Europe, could not withstand the German guns in 1914, and was occupied 9th October. The Steen Museum comprises remains of the citadel. Pop. (1846) 88,487; (1873) 126,663; (1900) 285,600; (1925) 300,026; with suburbs 417,000.

Antwerp is mentioned as early as the 8th century; in the 12th and 13th it gave signs of considerable prosperity, and in the beginning of the 16th century it was the commercial capital of the world. Its

Antwerp Cathedral.

government was free, and its people prosperous and well educated. In 1576 ('the Spanish Fury') it was seized by the Spanish soldiery; 8000 citizens, it is said, were murdered; and the city-hall and nearly a thousand fine buildings were burnt. This catastrophe and the assault of the Duke of Parma in 1585 caused Antwerp to sink into decay, and its population was scattered. From 1794 till 1814, while it was held by the French, Napoleon attempted to make it a great military and commercial centre. The union of Belgium with Holland in 1815 brought prosperity to Antwerp. By the revolution of August 1830 it was linked to the destiny of Belgium. The Dutch commandant, General Chassé, held the citadel, and bombarded the arsenal and city. In 1832 a French army reduced the citadel to ruins, and General Chassé capitulated. The city was handed over to the Belgians, and since the Peace of 1839 and the abolition in 1863 of the Scheldt shipping dues, Antwerp has had a singularly prosperous career. On the German advance in 1914 the government took refuge there. Associated with Antwerp are

the painters Matsys, Rubens, Vandyck, Teniers, Van Brée, and Jordaens, with Conscience the novelist and Van Meteren, historian; statues have been erected to most of these, to Leopold I., Van Ryswyck, and others. French is the business language, but the majority of the people speak Flemish.

Anubis, a son of Osiris (q.v.) in the mythology of Egypt (q.v.), a jackal-headed deity.

Anupshahr, a town of India, in the British district of Bulandshahr, United Provinces, on the right bank of the Ganges, formerly important for through trade across the river; pop. 6400.

Anu'ra. See AMPHIBIA.

Anuradhapura, or ANURADHA, a town of 5000 inhabitants in Ceylon, 80 miles N. of Kandy. It was for twelve centuries—from the 5th century B.C. onwards—the capital of the island, and the vast ruins of the ancient city have been only partly excavated or examined. The great tank or dam built for its water-supply in 460 A.D. was restored to use in 1888 (see CEYLON). Here stands what is left of the famous Bo-tree (q.v.) of Gautama.

Anus, the term applied by anatomists to the lower, or (in the case of animals) the posterior aperture of the intestinal canal; the rectum terminating externally in the anus. With regard to its anatomy, it is sufficient to state that it is kept firmly closed on ordinary occasions by the *external* and *internal sphincter* muscles, the former of which contracts the integument around the opening, and, by its attachment to the coccyx behind, and to a tendinous centre in front, helps the *levator ani* muscle in supporting the aperture during the expulsive efforts that are made in the passage of the fæces or intestinal evacuations; while the latter, or *internal sphincter*, is an aggregation of the circular muscular fibres of the lowest part of the rectum, and acts in contracting the extremity of the tube. The main function of the *levator ani* muscle is expressed in its name, it being the antagonist of the diaphragm and other muscles which act in the expulsion of the fæces. The integument around the anus lies in radiating plaits, which allow of its stretching without pain during the passage of the fæces; and the margin is provided with a number of sebaceous glands, which, in some of the lower animals, secrete strongly odorous matters (see ANAL GLANDS).

Infants are occasionally born with an *imperforate anus*, or congenital closure of the rectum. In the simplest and most common form of this affection, the anus is merely closed by thin skin, which soon becomes distended with the Meconium (q.v.), and can easily be divided. Cases where the obstruction is at a higher point are more serious; but even these can generally be relieved by a surgical operation. When this is neglected or is unsuccessful, death speedily takes place, with symptoms resembling those of intestinal obstruction from any other cause. *Spasm of the sphincter ani* is characterised by violent pain of the anus, with difficulty in passing the fæces. It is almost always caused by the presence of an ulcer or fissure, or by some morbid condition in neighbouring parts. *Ulceration* occurring as a breach of surface at one or more points around the anus, but not extending within the orifice, is sometimes met with; but more common and important is *fissure of the anus*, a term applied to a crack or superficial ulceration, situated between the folds of the skin and mucous membrane at the verge of the anus, and extending within the rectum. It gives rise to intense pain during the passage of the evacuations, and for some hours afterwards to great discomfort, smarting, and itching. The treatment to be adopted is to endeavour to procure regular and somewhat soft evacuations, and to sponge with warm water immediately afterwards, the parts being dried with a soft cloth. In slight and recent cases, one or two applications of solid nitrate of silver, with the use of a mild astringent lotion, will sometimes cure the disease. Where the pain is severe, division of the base of the fissure by the knife, or by stretching, is usually necessary. *Pruritus ani*, which simply means intense itching and irritation of this part, is usually a symptom of morbid changes rather than a special disorder; but sometimes occurs alone, and is often a very distressing and obstinate affection. It is often associated with an unhealthy state of the intestinal secretions, or with simple constipation; with a congested state of the mucous membrane; with a disordered condition of the womb; with the presence of thread-worms in the rectum, &c.; and it is peculiarly common in persons whose occupations are sedentary. The affection is often much aggravated by the patient's being unable to refrain from scratching the parts, which leads to excoriations, ulcerations, thickening of the skin, &c. Treatment must of course first be directed to these associated conditions, when present; and with their removal the irritation often disappears. A lotion containing carbolic acid, hydrocyanic acid or cocaine, or zinc ointment, or a suppository of zinc oxide and cocoa butter in equal parts, often gives relief. To prevent the reappearance of ulcerations, &c., a strong alum lotion should be used to bathe the parts night and morning. The other principal affections of the anus are Fistula, Piles, and Prolapsus, which are discussed in special articles.

Anville. See D'ANVILLE.

Anwari, a celebrated Persian poet who flourished during the 12th century, was born in Khorassan, and became a favourite of the Seljukide sultan, Sanjar. His poems consist chiefly of lengthy panegyrics and shorter lyrical effusions. The latter (*ghazels*) are characterised by simplicity, ease, and naturalness; but the *kasidas*, long poems mainly in praise of his patron, are disfigured by extravagant imagery and abound in keen sarcasm. Anwari was also a notable astrologer.

Anzin, a great metal-working town and coal-mining centre in the dept. of Nord, forming a north-western suburb of Valenciennes.

Aonlaganj', or AONLA, a decayed town of India, once the capital of Rohilkhand; pop. 13,000.

Aorangi. See COOK (MOUNT).

A'orist (Gr. *aoristos*, 'unlimited'), a form of the Greek verb by which an action is expressed as taking place in an indefinite time. It corresponds in meaning to the simple past tense in English, as 'he died.' The Greek language is especially fertile in the past tenses of verbs, having, in addition to the tenses common to other languages—namely, the imperfect, perfect, and pluperfect—the aorist, which is peculiarly adapted to the narrative style of writing. The distinction of first and second aorist is purely formal. The preterite in Germanic languages seems to be in part derived from the Indo-Germanic aorist.

Aor'ta is the great arterial trunk which, rising from the left ventricle of the heart, sends its branches ramifying through the whole body. The aorta in man is subdivided by anatomists into the arch, the thoracic aorta, and the abdominal aorta. The arch is a loop with the convexity directed upwards, forwards, and to the right side, reaching at its highest part to a level with the upper border of the cartilage of the second rib. Changing its direction, it runs from from right to left, and from before backwards to reach the left side of the spine at the lower border of the fourth dorsal vertebra, where it becomes the thoracic aorta. Five arteries

arise from the arch—viz. two coronaries, for the supply of the muscular tissue of the heart itself; the innominate, dividing into the right common carotid and right subclavian arteries; and the left common carotid and left subclavian arteries.

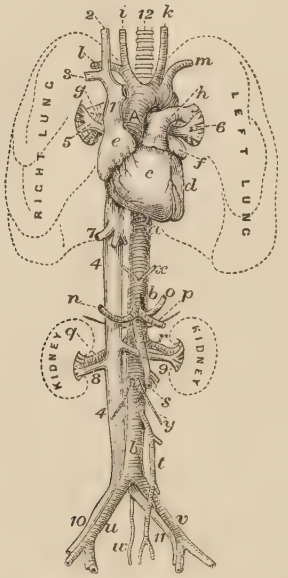


Diagram of the Aorta, with its principal Branches:

A, ascending part of the arch of the aorta; *a*, thoracic aorta; *bb*, abdominal aorta; *c*, *d*, right and left ventricles of heart; *e*, *f*, right and left auricles of the heart; *g*, *h*, right and left pulmonary arteries; *i*, *k*, right and left common carotid arteries; *l*, *m*, right and left subclavian arteries; *n*, hepatic artery; *o*, gastric artery; *p*, splenic artery; *q*, *r*, right and left renal arteries; *s*, *t*, superior and inferior mesenteric arteries; *u*, *v*, right and left common iliac arteries; *w*, middle sacral artery; *x*, phrenic arteries; *y*, spermatic arteries.

1, superior vena cava; 2, right internal jugular vein; 3, right subclavian vein (the left is removed to show the arch of the aorta); 4, inferior vena cava; 5, 6, right and left pulmonary veins; 7, hepatic veins; 8, 9, right and left renal veins; 10, 11, right and left iliac veins; 12, trachea.

At the commencement of the aorta there are three small swellings or pouches, the aortic sinuses, internal to which are the three semilunar valves or folds of the lining membrane, which prevent regurgitation of the blood into the heart. The thoracic aorta extends from the lower border of the fourth dorsal vertebra to the diaphragm, gradually reaching the middle line of the spine. The thoracic aorta gives off the bronchial arteries (two or three) to supply the tissue of the lungs; and some small branches (three or four) to the œsophagus, and intercostal arteries, to supply the walls of the chest (usually nine on each side, the upper two intercostal spaces being supplied by a branch from the subclavian artery). The abdominal aorta passes from the diaphragm to the fourth lumbar vertebra, opposite the body of which it divides into the two common iliac trunks. The abdominal aorta gives off: (*a*) Branches to the abdominal viscera. These are either single or in pairs. The single arteries are—the cœliac axis, which divides into three large branches for the stomach, liver, and spleen; the superior mesenteric, for the small, and part of the large intestine; the inferior mesenteric, for the large intestine not supplied by the superior mesenteric. The paired arteries are the supra-renal, renal, and spermatic or ovarian. (*b*) Branches to the abdominal walls —viz. the two phrenic arteries to the diaphragm; the lumbar arteries, four pairs, for the supply of the lower part of the abdominal wall (the loins); the middle sacral or *caudal* artery, a small vessel which arises from the back of the aorta just above its point of bifurcation. In fish and animals with tails, this branch is the caudal prolongation of the aorta.

The above is the usual arrangement; but occasionally it varies, especially in the number of arteries springing from the arch. The structure of the aorta will be given under ARTERIES; and the comparative anatomy under CIRCULATION.

During fœtal life, there is a communication between the arch of the aorta and the pulmonary artery, called the *ductus arteriosus*, the canal of which becomes obliterated after birth. In the human carotid artery, it has been calculated that the blood-stream moves with a velocity of 10½ inches per second, and that the pressure of blood in the same vessel would support a weight of 3 lb. 2 oz. to the square inch.

The coats of the aorta are very subject to fatty disease termed Atheroma (see ARTERIES), and in advanced life, to calcareous degeneration or deposit of lime-salts, which destroys their elasticity. This change renders them very liable to Aneurism (q.v.), which, as may be expected, is generally situated at the curves of the aorta, especially at the arch, where the force of the blood-stream is greatest.

Aosta, a cathedral city of Italy, on the Dora Baltea, at the junction of the roads crossing the Little and the Great St Bernard Passes, and 80 miles NNW. of Turin by rail. It is surrounded by orchards, vineyards, and almond plantations, and stands 1900 feet above sea-level. The ancient *Augusta Prætoria Salassorum* (founded 25 B.C.), Aosta has many Roman remains, including town walls, the Porta Prætoria, Arch of Augustus, &c. St Bernard was archdeacon of Aosta; and here Anselm, Archbishop of Canterbury, was born. Pop. (1921) 10,015. The beautiful valley of Aosta, between the Graian and Pennine Alps, is rich in woods, pastures, minerals, and hot mineral springs (including Courmayeur and Pré St Didier). The natives speak a French patois. Cretinism prevails to a lamentable extent. The Duke of Aosta is a royal prince of the house of Savoy.

Apa'ches, a tribe of North American Indians, of the Athabaskan family, formerly living in southern Arizona and New Mexico. Fierce and war-like, they were long the scourge of the frontier regions of the United States and Mexico, the difficult character of their country and their remarkable hardihood and daring rendering it a severe task to subdue them. This was not completely accomplished until 1886. They were then placed on a reservation in Arizona, a band of special savagery being sent farther north and held as prisoners. Some of them proved efficient workers at the Roosevelt irrigation dam in Arizona. The name is applied to desperados in Paris.

Apalachicola. See APPALACHICOLA.

Apatin', a town of Yugoslavia (till 1920 Hungary), on the left bank of the Danube, 49 miles SW. of Theresiopol. It manufactures woollen cloth, and trades in hemp, silk, madder, and woad, the products of the vicinity. Pop. 15,000.

Apatite (Gr. *apatē*, 'deception'), a mineral, consisting chiefly of phosphate of lime, so named because it resembles various other minerals for which it might be mistaken. The different varieties of apatite contain a little fluoride or chloride of calcium, or both, as well as phosphate of lime. The contained phosphoric acid is doubtless due to the accumulation of excrementitious or other animal deposits along shores or in pools during Tertiary times. It occurs both massive and in crystals, which are generaly small, and are often

six-sided prisms, or six-sided tables, but some very large ones have been brought from Canada. It occurs in some of the tin-mines in Cornwall, Saxony, Bohemia, &c., and in rocks of various ages. It is found of various colours, more or less green, blue, or red, sometimes white, and often gray. It frequently occurs, generally in the form of small needles, as a rock-constituent, in such rocks as granite, dolerite, diorite, &c. The massive radiated variety of apatite is called *phosphorite;* and when massive, earthy, and impure, it is known as *osteolite.* These massive varieties may occur in veins, beds, or irregular masses, and are perhaps most abundantly met with amongst the archæan rocks. In Spain they occur in cretaceous strata. These mineral phosphates of lime are much used in the preparation of manures, on account of the contained phosphoric acid. The commercial supplies come mainly from Norway, Canada, parts of the United States (Carolina, Florida, Tennessee), and Algiers. Coprolites are phosphatic nodules. Commercially, any natural lime-phosphate is known as apatite. Hence phosphatic nodules, and the interesting 'rock-guano,' called *osite* or *Sombrerite*, are alike spoken of as apatite. Sombrerite has been obtained in large quantities from the small island of Sombrero, to the east of the Virgin Islands, in the British West Indies. It is now believed that this hard or rock guano has been formed by water filtering through ordinary guano into the coral rock adjoining, and turning it more or less completely into phosphate of lime. The general treatment to which mineral phosphate is subjected is to reduce it to powder, and act upon the pulverised matter with sulphuric acid, which renders the phosphoric acid in the apatite soluble in water. See MANURE, LIME, PHOSPHORUS.

Ape, a term variously used for the anthropoid apes, for the tailless or the short-tailed apes, and for monkeys generally; or specifically for the majority of monkeys, with the exception of the anthropoids on the one hand, and the lemurs, or semi-apes, on the other. Thus defined, the apes include (*a*) the *Arctopithecini*, or marmosets, small furry South-American forms like squirrels—e.g. Hapale and Midas; (*b*) the *Platyrrhini*, or broad-nosed New-World apes, almost always quadripedal, without cheek-pouches or callosities on the hips—e.g. Mycetes or howling-monkey, Cebus or Capuchin, Ateles or spider-monkey, Pithecia, Chrysothrix or squirrel-monkey, and Nyctipithecus; (*c*) the majority of the *Catarrhini*, or Old-World monkeys, with a narrower partition between the nostrils, and never with prehensile tail. Only the lower forms, or Cynomorpha, are included in this classification, the higher Anthropoids being separated (after Hartmann) to form along with man the higher family Primarii. The Cynomorpha (dog-like) include Baboons (*Cynocephalus*), Mandrills (*Papio*), Macacus, the Barbary Ape (*Inuus*), Cercopithecus, Colobus, the Sacred Monkey (*Semnopithecus*), &c. See MONKEYS, ANTHROPOID APES.

Apeldoorn, a flourishing town of the Netherlands, in the province of Gelderland, 17 miles N. of Arnheim. The Loo, a royal hunting-lodge, beloved of William of Orange, is in the neighbourhood. There are a great many paper-mills in Apeldoorn, most of the paper manufactured being sent to the East Indies. Other industries are agriculture, grinding corn, copper-founding, and manufacturing blankets and coarse woollen cloth. Pop. 57,000.

Apelles, the most celebrated painter in ancient times, was the son of Pytheas, and was probably born at Colophon, on the Ionian coast of Asia Minor. He flourished in the latter part of the 4th century B.C., received his first instruction in art under Ephorus in the Ionian school of Ephesus, and afterwards at Sicyon, and thus he united the fine colouring of the Ionian with the accurate drawing of the Sicyonic school. During the time of Philip, he visited Macedon, where he became the intimate friend of Alexander the Great. Pliny relates that on one occasion when Alexander visited Apelles in his studio, the king exhibited such ignorance of art, that the artist recommended him to be silent, as the boys who were grinding the colours were laughing at him. He is said to have accompanied Alexander on his expedition to Asia, and to have settled at Ephesus. The most celebrated paintings of Apelles were his Anadyomene, or Aphrodite rising from the Sea, the Graces, and others on similar subjects. His portrait of Alexander wielding a thunderbolt was very famous. Apelles willingly acknowledged the merits of his contemporaries. When his pictures were exposed to public view, he used to place himself behind a picture, to listen to the criticisms of the common people. A cobbler having detected a fault in the shoe of one of his figures, it is said that Apelles instantly rectified it; but when the cobbler, on the following day, extended his criticism to the legs, the painter rushed from his hiding-place, and told the cobbler to stick to his last; or, in the Latin version, which has become proverbial, 'Ne sutor supra crepidam (judicaret).' All that we know of his art is derived from late Greek and Roman authors; but he seems to have combined many of the excellences of his predecessors. He did not belong to the noblest period of art, and seems to have been more remarkable for skilful effects and elaborate finish than for originality.

Apelles, a 2d-century Marcionite, less definitely dualistic than Marcion himself.

Ap'ennines, a mountain-chain extending 740 miles uninterruptedly throughout the whole length of the Italian peninsula. It belongs to the system of the Alps, from which it branches off near Savona. From this point, the chain, under the name of the Ligurian Apennines, girdles the Gulf of Genoa, in the immediate vicinity of the sea, and then runs inland, forming the watershed between the Adriatic and the Mediterranean, but gradually approaching the east coast, till, in the highlands of the Abruzzi, it is close upon it; after which it takes a southerly direction through Naples, dips under the sea at the Strait of Messina, and reappears on the northern coast of Sicily. The chain is divided by geographers into the *Northern*, the *Central*, the *Southern*, and the *Sicilian Apennines.* The leading feature of the Apennines, wherever they approach the coast, is their extraordinarily steep declivities; while in Middle Italy and the adjoining portions of Upper and Lower Italy, long terraced plateaus, lower ranges, and extensive coast-plains mark their gradual descent on the west. The main chain of the Apennines does not send off spurs into the Apulian peninsula.

The direction of the great chain of the Apennines is favourable to the formation, on the west side, of largish river-basins, such as those of the Arno, the Tiber, the Garigliano, and the Volturno; while on the east side we find nothing but small streams, in most cases destitute of affluents, hurrying down to the sea through wild precipitous valleys.

The average height of the entire chain of the Apennines is about 4000 feet, which, however, in the north, sinks down to little more than 3500 feet; and in the mountains of the Abruzzi, rises to 7000 feet. Here, in Monte Corno, the highest peak of the range known under the name of Gran Sasso d'Italia, they reach an elevation of 9574 feet, and in Monte Velino, of 7916 feet.

The Apennines are crossed by thirteen principal passes, the majority traversed by railways. The

strata are principally of Jurassic, Cretaceous, and Tertiary age. The central ridges, especially in the middle and south, consist largely of Jurassic limestones, &c., Triassic rocks appearing here and there in the axes of the deeper folds. These central folds are flanked on the north-east and south-west by more or less interrupted belts of Cretaceous rocks, which again are overlaid by Pliocene formations. In the north, rocks of Eocene, Oligocene, and Miocene age predominate. The Apennines, especially the Roman and Neapolitan, are notable for rich variety of marbles. Volcanic rocks abound in the middle and southern regions.

The principal chain exhibits, for the most part, a dreary and barren appearance. It looks like a vast wall, with very few projecting peaks to break its dull monotony. Only in the Abruzzi, in the Sub-Apennines, and above all, in the marble mountains of Carrara and Seravezza, do the bold and magnificent forms of the Alps appear. Where water is plentiful there is no lack of rich pastures and dense forests; but usually only thin grass and wild scrubby bushes cover the stony slopes. The greater number of the forest brooks, with deep rocky ravines, display, during summer, only a dry bed. Where the mountains dip down to the sea, as at the Riviera of Genoa and the Gulf of Naples, a rich, peculiarly southern vegetation clothes the declivities. There is no region of perpetual snow; but the summits of the Abruzzi and the lofty peaks of Lunigiana are often covered with snow from October far into May, and send their icy breath so suddenly down into the mild valleys, that the temperature in a few hours sinks 12° or 18° F.

Apenra'de. See ABENRAA.

Apenta, a bitter alkaline spring at Budapest.

Apera, a genus of grasses, of two species, natives of Europe (including England) and W. Asia. The handsome, silky bent-grass (*A. Spica-Venti*) grows in sandy fields.

Aperients are substances which are employed to cause intestinal evacuations. Many articles of food, such as oatmeal, brown bread, and bran biscuits, and fruits such as figs, prunes, and strawberries, are used for this purpose; but the term is usually applied to denote certain medicines which act upon the intestines and cause them to expel their contents. Although considerable progress has been made in recent years in the investigation of the action of various drugs upon the intestines, we are as yet unable to give a final classification to them. For practical purposes, however, we may classify aperients as follows: (1) laxatives and (2) purgatives—(*a*) cathartic and (*b*) drastic. (1) Laxatives are substances which only slightly increase intestinal action. They act without causing any irritation or griping. The chief examples of this class are manna, magnesia, liquid paraffin, olive oil, sulphur, and castor oil in small doses. (2) Purgatives—(*a*) Cathartics are substances which quicken or increase the evacuations from the intestines, and in their action may cause griping. Examples of this class are aloes, castor oil in large doses, rhubarb, and senna; (*b*) drastics are substances which are prompt, powerful, and effective in operation. Colocynth, croton oil, elaterium, gamboge, jalap, podophyllin, and scammony belong to this class. Besides the substances already enumerated, we must mention the saline aperients—e.g. sulphates of potassium, sodium, and magnesium, tartrates of potassium and sodium, phosphate of sodium, and citrate of magnesium. Of the above drugs, bitartrate of potassium, elaterium, and gamboge act as hydragogues (Gr. *hydōr*, 'water,' and *agō*, 'I drive away'), as they tend to remove water from the system; and aloes, euonymin, iridin, mercurial preparations (blue pill, calomel), podophyllin, and rhubarb, act as cholagogues (Gr. *cholē*, 'bile'), as they increase the evacuation of bile. Purgatives may be said to act in three ways—(1) by increasing the peristaltic action of the intestines; (2) by causing an increase of the secretion from the intestinal mucous membrane; and (3) by preventing the absorption of the fluids of the intestines. Purgatives have various uses, for they not only remove the contents of the intestines, but also prevent the accumulation of fæces in them, and the irritation such accumulation causes. They are useful in cases of dropsy, to remove excessive fluids from the body. In fever they lower the temperature, and they are of use in lowering the blood pressure in certain diseases. Lastly, in cases of hernia, aneurism, and some other disorders, they are beneficial in preventing difficulty in the act of defæcation. Although the use of aperients is of undoubted benefit, yet their abuse is much to be deprecated, as to employ them habitually or promiscuously may produce serious results. There are also used as aperients many Mineral Waters (q.v.).

Apet'alous ('without petals'), a term applied somewhat indefinitely to those flowering plants in which the petals are absent. It represented a distinct subdivision in A. de Jussieu's classification, Apetalæ—broadly corresponding to Monochlamydeæ of later authors, but is more convenient as a merely descriptive term, since the absence of petals occurs not only in entire groups, like the catkin-bearing Amentaceæ, but in degenerate forms in many unrelated orders. When both calyx and corolla are absent, the term *achlamydeous* (Gr. *chlamys*, 'a covering') is sometimes used.

Aphasia is the term originally introduced by Trousseau to denote the inability to express thought by means of speech which follows certain diseases of the brain; in recent years, however, it has obtained a wider significance, and may now be defined as the loss of the faculty of interchanging thought, without any affection of the intellect or will. The interchange of thought involves, in the first place, the expression of mental processes by means of conventional symbols, and, in the second place, the comprehension of these symbols. Language, in its widest sense, includes all the methods by which thought may be communicated, and makes use of three classes of symbols—gestures, speech, and writing. The interchange of thought may be interrupted by derangement (1) of the expression of mental processes by their corresponding symbols, or (2) of the comprehension of the meaning of these symbols. In other words, there may, on the one hand, be an interference with the channels through which thought is translated into symbols; and, on the other hand, there may be a derangement of the channels by means of which symbols are interpreted as thought. In the former case, the change affects the mechanism conducting from the mental idea to the symbol, which is often termed the motor symbol process; in the latter, there is an alteration in the mechanism conducting impulses from the symbol to the mental idea, often called the sensory symbol process. There is therefore a motor and a sensory aphasia, and either of these may affect one or more of the three classes of symbols mentioned above.

In *motor aphasia*, there is a loss of the memory of the co-ordinated movements necessary for the formation of symbols, and this usually includes gestures, speech, and writing. The inability to write is commonly termed agraphia. The patient is unable to originate the name of any object shown to him, although he evidently knows what it

is, and he cannot reply to any question although he clearly understands it. Sometimes when he is shown an object and asked if it bears a name mentioned, he may be able to show acquiescence or dissent by means of gestures, but usually even this power is absent.

In *sensory aphasia*, there is loss of the memory of the meaning of symbols. This may affect the recollection of spoken language. The patient can hear every sound, but cannot understand a single spoken word. He can speak himself with more or less fluency, but without understanding his own words, or detecting any errors he may make, and in speaking he usually commits many mistakes; he can also read printed and written language, and he can write himself. This condition is termed word-deafness. Sensory aphasia may also be due to a loss of the recollection of written, printed, or gesture language. The sight is sufficiently good to enable the patient to distinguish objects clearly in most cases (although the extent of the field of vision is often somewhat diminished), and he can name these objects quite correctly. He is able to converse perfectly, and to write either his own thoughts or to dictation, but he cannot read what he has written, or detect any mistakes in it. He can slavishly copy printed and written words, as if he were drawing, without understanding their meaning, and he copies all mistakes. This is what is known as word-blindness.

It must not be forgotten that aphasia is entirely independent of any affection of the intellect. It must further be carefully distinguished from mere loss of speech caused by difficulty in articulation due to paralysis. This condition is commonly known as aphemia.

Turning to the localisation of the diseases which cause the different varieties of aphasia, we find that our knowledge has recently been much extended, not only by the careful observation of clinical and pathological facts, but also by the results of experimental investigation. These two methods of inquiry are both of great use in checking their several facts. While the individual muscular acts required in the motor symbol process are ruled by centres in the spinal cord and medulla oblongata, the seat of the memory of their co-ordinated movements is in the brain. It may be well to mention here that the nerve-impulses cross from one side of the body to the other in their course from centre to periphery, and *vice versâ*. While the majority of mankind therefore are right-handed, they are also left-brained. This greater use of the left half of the brain applies to the communication of ideas in every way. No doubt the right side takes up the work of the left, after a time, in the case of any lesion, and this is more especially the case when the affection has come on in early life. In the lower part of the frontal lobe of the brain are situated the centres concerned in the co-ordination of the muscular acts in articulation, the exact position being the third or lowest convolution, usually called Broca's convolution in honour of the distinguished man who first pointed out the connection between disease in this spot and aphasia. Any lesion in this region causes motor aphasia, and if both sides of the brain are affected, this will be complete and permanent. A little higher in the frontal lobe are the centres for gesture and for writing. The auditory perception of words has its centre in the highest convolution of the temporo-sphenoidal lobe. Disease of this part of the brain causes word-deafness. The visual perception of words depends on the integrity of the angular gyrus of the parietal lobe, and if this convolution is affected, the symptom described as word-blindness ensues. See BRAIN.

Aphelion, that point in the elliptical orbit of a planet which is most remote from the sun. The opposite point, or that nearest to the sun, is styled the Perihelion. At the former point, the swiftness of the planet's motion is least, and begins to increase; at the latter, it is greatest, and begins to decrease. This irregularity of motion is most remarkable in comets whose orbits deviate most from the circle. The word is a Grecised form of Kepler's Lat. *aphelium*, from Gr. *apo*, 'from,' and *hēlios*, 'sun.' See APSIDES, ORBIT.

Aphemia, a paralytic disease (see APHASIA above), in which words are understood and remembered, but the power to utter them is lost.

Aphides (Gr.), a family of small 'plant-lice' belonging to the order of hemipterous insects. They occur very abundantly in temperate regions as parasites on the roots, leaves, stems, &c. of plants, to which they frequently do great damage. Towards the tropics they seem to be replaced by the families to which the cochineal insects and Cicadas belong. The Rose Aphis, the 'colliers' of the bean-plant, the cottony 'American blight' of apple-trees, and the Phylloxera (q.v.) of vines, are too familiar representatives of the family. The mouth organs are adapted for piercing and sucking plants, and consist of four long sharp stylets within a proboscis or sheath. The posterior end of the body usually bears two projecting honey-tubes, which emit a sweet secretion. Wings may be absent in both males and females, but are usually present in the former, and absent in a section of the latter to be afterwards noted. The legs are long and slender, but not adapted for rapid movement; in fact, the aphides rarely wander far from their birthplace, except during the spring and autumn migratory flights of the females. Many forms migrate at the beginning of summer to another kind of plant, and return in autumn to their original haunt; but others seem to restrict their attentions to one form. The body is often brightly and protectively coloured—very frequently green or brown. They are generally dusted over with a protective mealy substance, and many forms exhibit a silky or cottony coat. The troublesome 'green-fly' may be of various species.

Their presence is readily detected by marks, wrinkles, or abnormalities on the infested plant, and notoriously also by the 'honey-dew' which they secrete. This glutinous sweet substance which covers the leaves of trees, &c., especially during warm weather, is sometimes abundant enough to drop to the ground. It has excited interest from very early times, and has a widespread popular reputation for medicinal virtues. Pliny hesitates whether he ought to regard it as 'the sweat of the heavens, the saliva of the stars, or a liquid produced by the purgation of the air.' It is, however, a by-product, perhaps manufactured within the aphis from the juices of the plant on which it preys, or very probably an excretion, if not even a mere overflow, of surplus undigested glucose. The secretion oozes out from the honey-tubes above referred to, but similar products have also been observed to issue from the anus. Ants and other insects greedily hunt for this luxury, and the former have been seen tickling the aphides to induce secretion. They also tend, protect, and imprison these valuable sources of sweetness, which Linnæus long since expressively called their 'cows' (see ANT). Besides injuring or killing plants by preying upon their juices, the aphides produce abnormal growths and Galls (q.v.). These are often of considerable size, and sometimes exhibit a protective mimicry of fruits. They serve as the homes or cradles of the parasites. The reproductive relations have been for long noted on account of the

prevalence of parthenogenesis, or reproduction without fertilisation. At the end of autumn both male and female forms may be observed; and the fertilised eggs deposited in some safe place are hatched in spring, and give rise to female parthenogenetic forms, which are usually winged, and produce their young alive. Throughout summer there is a constant succession of parthenogenetic, viviparous females, and the number of generations appears to be limited only by temperature and food-supply. The return of autumn, however, means of course lowered temperature and scarcity of food, and these conditions are associated with the production of males. These fertilise the females, which are at this stage wingless, and the winter eggs are then laid. It appears that males may sometimes occur along with the viviparous forms, and that the latter may perhaps occasionally hibernate; but it is nevertheless demonstrable that warm weather and abundant food are conditions which result in the production of parthenogenetic females, while scarcity of food and cold weather cause the reappearance of males, and consequent sexual reproduction. Thus Réaumur succeeded in rearing above fifty parthenogenetic generations, all descended from one mother, by keeping up, for three or four years, an artificial summer. The experiment has been often repeated, and the viviparous parthenogenesis retained for even longer periods. The viviparous females are

Fig. 1.—Aphis padi. (After Kessler.)
The figure represents equally well, 1, the autumn forms—the sexual male and the wingless female, the parents of the spring brood; 2, winged and wingless viviparous parthenogenetic forms occurring in spring; and 3, an autumn winged female appearing after a succession of wingless forms.

frequently equipped with wings, which are generally absent in the egg-laying forms. They differ in other respects, but especially in the simplified structure of the reproductive organs, from which the young are developed by a process comparable to internal budding. So, too, the early spring forms, arising from fertilised eggs, resemble their sexual parents, and differ markedly from their parthenogenetic progeny. The eggs of aphides develop into active six-footed larvæ, which moult several times (see METAMORPHOSIS), and give rise to six-footed pupæ, which finally become imagos.

It is quite impossible to give in figures any idea of the prolific increase of these luxurious parasites. Even during its short lifetime an aphis may have a progeny computable only in billions. A score may be born in as many hours, and these become in a few days the founders of new families. From a form producing only one per day, a population of not less than the fifteenth power of 210 would be the result at the end of 300 days, while an even more moderate computation given by Huxley shows that the tenth brood alone would weigh more than 500 millions of stout men. The increase is continually checked, however, by storms and sudden changes of weather, and also by the voracity of birds and insects. Some insects regularly feed upon aphides, while others deposit their ova in their living bodies (see ICHNEUMON), and thus utilise them as living cradles for their young, which, in such cases, are literally born out of death. Favouring circumstances sometimes lead to the appearance of extraordinary swarms of aphides, which have been noted in local histories as 'darkening the sun,' and have left a more permanent mark in the destruction of certain crops. In this connection the tiny plant-lice are of some economic importance. Apart from the vine insect Phylloxera (q.v.), which does so much damage in the vineyards of the Continent and North America, the aphides of turnip, cabbage, potato, bean, apple, pear, larch, &c. have frequently been the cause of widespread loss. The price of hops varies from one year to another very much according to the prevalence of the 'fly.' For the last hundred and fifty years aphides have been unremittingly studied. Their life-history was first precisely investigated by Réaumur and Bonnet, and many of the most noted naturalists have continued their researches. The reader is referred to G. B. Buckton's Ray Society Monograph on British Aphides (4 vols. 1876); Theobald's *Plant-lice of Great Britain* (1926 *et seq.*); and for practical purposes Miss Ormerod's work on *Injurious Insects*.

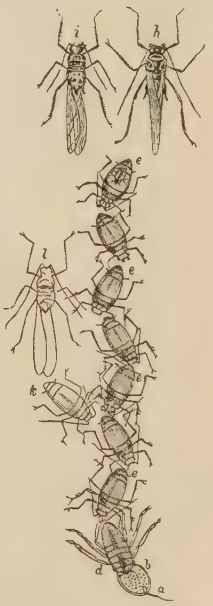


Fig. 2.—Owen's figure, showing life-history of Aphis:
d, the first spring form developing from fertilised ovum; *e*, the succession of parthenogenetic viviparous forms; *h* and *i*, the reappearance of sexual individuals, male and female, in autumn; *k* and *l*, the appearance of sexual forms at an earlier date.

Aphonia. This term is applied to loss of voice from whatever cause arising. Normally, the production of the voice is due to (1) the tension of the vocal chords, and (2) respiratory effort. Loss of voice may therefore depend upon (1) laryngeal disease or (2) deficient respiratory power. The morbid conditions of the larynx may be either functional—as in hysterical aphonia—or organic, when the lesion is either situated in the larynx, or due to an affection of the laryngeal nerves or nerve centres. See LARYNX. The vocal chords themselves may be more or less destroyed, and yet a certain amount of vocal power remain, because it sometimes happens that the false chords come together, and when they are caused to vibrate by the passage of air, produce a harsh, but distinct voice. Loss of voice may also—as could be inferred from what has just been stated—arise from diseases of the respiratory organs or general weakness. The treatment must of course depend upon the morbid condition which causes loss of voice, and can only be determined in each case after careful examination with the laryngoscope.

Aph'orism (Gr.), a principle expressed tersely in a few words, or a short and pithy sentence conveying a general truth; such as, 'Use is second

nature.' A whole work is sometimes written in the form of a series of aphorisms, arranged in due order, and leaving their connection to be traced by the reader's reflection. Occasionally impressive, this style is more often wearisome. The name was first used in the *Aphorisms* of Hippocrates.

Aphrodi'té, one of the chief divinities of the Greeks, the goddess of love and beauty, so called because she was sprung from the foam (*aphros*) of the sea. She was the wife of Hephæstus, but she loved besides, among gods, Ares and Dionysus, and among mortals, Anchises and Adonis. The chief places of her worship in Greece were Cyprus and Cythera. Aphrodite not only surpassed all other goddesses in beauty, but she had the power of granting irresistible beauty and attractiveness to others, especially to wearers of her magic girdle. The sparrow, the dove, and the swan were sacred to her, as also the myrtle, the rose, and the poppy. In the later poets, Eros is her son and her constant companion. Only such sacrifices as flowers and incense were made to Aphrodite. In earlier times the patroness of marriage and maternity, she became later the ideal of graceful womanhood, and was spiritualised by Plato as *Aphrodite Urania.* By others she was degraded in *Aphrodite Pandēmos* to be the patroness of mere sensual love. Mysteries of an impure kind formed part of the ceremonial of the *aphrodisia,* or festivals held in her honour. Aphrodite was probably not originally identical with Astarte, or the Ashtoreth of the Hebrews. The Aphrodite of Cyprus is most probably a goddess of vegetation, and one form of the great goddess of the gifted Ægean people whose 'Minoan' culture lived longest in Cyprus. By the Romans she was identified with Venus, hitherto one of the least important Roman divinities (see VENUS). Aphrodite has had the most important place in the history of art as the Greek ideal of feminine grace and beauty. Her most famous statue in antiquity was that of Praxiteles at Cnidus; her most famous picture, the *Aphrodite Anadyomene* of Apelles. The finest statues of the goddess that still exist are those of Melos (Milo) at Paris, of Capua at Naples, and of the Medici at Florence. For aphrodisiacs, see PHILTRE.

Aph'thæ are small whitish ulcers, usually commencing as vesicles, on the surface of a mucous membrane. The whitish substance generally contains large quantities of a minute fungus, *Oidium albicans.* They are painful, and may be extremely so. The most common site of aphthæ is the mucous membrane of the lips and mouth, but they occasionally appear wherever mucous membrane approaches the skin.

Infants are liable to an aphthous eruption termed *Thrush* (q.v.). Aphthæ in adults are generally a consequence of fevers and other diseases, or a symptom of disturbance of the digestive system. In some cases of pulmonary consumption, they form a painful addition to the patient's sufferings. In ordinary cases of aphthæ, a preparation of borax, or some antiseptic wash, generally effects a rapid cure. Where the pain is severe, a simple application of solid nitrate of silver is the best remedy.—For Aphthous Fever, see MURRAIN.

Apia. See SAMOA.

Apianus, PETRUS (1501–52), professor of mathematics at Ingolstadt, was an eminent cosmographer; and so was his son Philip, his successor.

Apicius, MARCUS GABIUS, a Roman epicure, of the times of Augustus and Tiberius. It is said that when he had spent £800,000 upon his appetite, and had only some £80,000 left, he poisoned himself in order to avoid the misery of plain diet. Two other gourmets—one a contemporary of Sulla, the other of Trajan—bore the name Apicius. The Roman cookery-book, *Cœlii Apicii de Opsoniis et Condimentis, sive de Re Culinaria, Libri decem,* ascribed to Apicius, must belong to a much later time, inasmuch as it abounds in inaccuracies and solecisms. Its author thought proper to recommend his work to gourmets by affixing to it the celebrated name of Apicius.

Apion, a Greek grammarian, was born in the Libyan oasis, but educated in Alexandria, which he affected to consider his birthplace, from a wish to be thought a pure Greek. Settling at Rome about 30 A.D., he became famous as a teacher of rhetoric. He seems to have been as remarkable for his loquacious vanity as for his knowledge and real oratorical power. From his ostentatious disputations Tiberius used to call him *Cymbalum Mundi* ('the cymbal of the universe'). With the exception of one or two fragments, the whole of Apion's numerous writings are lost. These included a work on the text of Homer; a work on Egypt, which contained the far-famed story of 'Androclus and the Lion,' preserved by Aulus Gellius; a work against the Jews, to which Josephus replied in his work *Against Apion;* and one in praise of Alexander the Great.

Apios, a genus of Leguminosæ, with tuberous, starchy, edible rhizomes. Attention was directed by the French traveller Lamare-Picquot to the North American *A. tuberosa.* Cultivated for a time in North Italy, it has run wild, flowering freely, but not forming fruit. It propagates by tubers.

A'pis, the bull worshipped by the ancient Egyptians, who regarded it as a symbol and incarnation of Osiris, the husband of Isis, and next to Râ, the great divinity of Egypt. A sacred court or yard was set apart for the residence of Apis in the temple of Ptah at Memphis, where a numerous retinue of priests waited upon him, and sacrifices of red oxen were offered to him. His movements, choice of places, and changes of appetite were religiously regarded as oracles. It was an understood law that Apis must not live longer than twenty-five years. When he attained this age he was secretly put to death, and buried by the priests in a sacred well, the popular belief being that he cast himself into the water. If, however, he died a natural death, his body was solemnly interred in the Temple of Serapis at Memphis, and bacchanalian festivals were held to celebrate the inauguration of a new bull as Apis. As soon as a suitable animal was found having the required marks—black colour with a white square on the brow; the figure of an eagle on the back, and a black knot in the shape of a cantharus under the tongue (*scarabeus*)—he was led in triumphal procession to Nilopolis at the time of the new moon, where he remained forty days, and was afterwards conveyed in a splendid vessel to Memphis. The worship of the golden calf by the Israelites in the wilderness, and also the employment of golden calves as symbols of the deity by Jeroboam, have been very generally referred to the Egyptian worship of Apis.

Aplanatic Lens, an achromatic lens corrected for spherical aberration, so that all rays that come from one point and pass through the lens are focussed at a point; specially useful in photography.

Apnœa, cessation of breathing, following a period when respiration has been abnormally active—e.g. after artificial respiration, or, on a small scale, when deep breaths are taken before diving. It is usually attributed to the saturation of the blood with oxygen, but it also follows excessive stimulation of the vagus nerve, independently of the state of the blood.

Apoc'alypse. See REVELATION OF ST JOHN.

Apocalyp'tic Number is the mystical number 666, spoken of in the Book of Revelation (xiii. 18). Among the Greeks and Hebrews the letters of the alphabet were used to denote numbers. Hence such letters must be taken as will, when used as numbers, make up 666 (either in the Greek or Hebrew alphabet) as the letters of the name in question. The best solution of the riddle is 'Neron Kesar,' the Hebrew form of the Latin 'Nero Cæsar.' The vowels *e* and *a* are not expressed in the ancient Hebrew writing. The number represented by NeRON KeSaR would be 666, thus:

N R O N K S R
50 + 200 + 6 + 50 + 100 + 60 + 200 = 666.

Other interpretations were adopted in early times, as *Antichrist* and *Lateinos*, the latter being supposed to refer to the Roman empire, and even in more recent times being explained by Protestant controversialists of greater zeal than discretion, as a prophetic allusion to papal Rome. See ANTICHRIST; De Morgan's *Budget of Paradoxes* (1872).

Apocalyptic Writings are such as, like the prophecies of Daniel, their prototype, set forth in a figurative and pictorial manner the future progress and completion of the world's history, especially in its religious aspects. The two apocalyptic books received into the canon of Scripture are the books of Daniel and the Apocalypse specially so called, the Revelation of St John. But Jewish and early Christian literature produced numerous apocalypses from about 200 B.C. to 200 A.D. Most of them were attributed to famous men of old by their authors, and are accordingly cast in prophetic form, though the author is pretty obviously commenting on past history. They deal largely with the increasing troubles and trials of God's people, and their final redemption and salvation. They are accordingly very valuable sources of information as to the development of Messianic and eschatological ideas before and after Christ. The Book of Enoch (q.v.) is one of the most important. The Psalms of Solomon (q.v.) are Hebraic, the Odes of Solomon Christian. The Sibylline Oracles are described at SIBYL, the Testaments of the Twelve Patriarchs at TWELVE PATRIARCHS. The Book of Jubilees professes to be a revelation made to Moses of the course of events from Adam, and is divided into fifty periods of fifty years each—hence the name. Other apocalyptic books are the Assumption of Moses, the Apocalypse of Baruch, the Ascension of Isaiah. For Fourth Esdras, see ESDRAS; the Shepherd of Hermas is done at HERMAS. See also APOSTLES (TEACHING OF THE TWELVE). Some of them are known only from Ethiopic, Syriac, or even Slavonic translations. See Charles on 'Apocalyptic Literature' in *Encyclopædia Biblica*, and his *Testaments of the Twelve Patriarchs* (1908); and Fairweather, *The Background of the Gospels* (1909).

Apocar'pous Fruits, in Botany, are those fruits which are the produce of a single flower, and are formed of only one carpel, or of a number of carpels remaining free and separate from each other. The term is derived from the Greek *apo*, implying separation, and *karpos*, fruit.

Apocatas'tasis. See HELL.

Apocrenic Acid (Humic Acid, Ulmic Acid) is one of the products of the natural decay of wood or other plant textures, and is found where woody fibre is decomposing in soils. It is soluble in water, and is an intermediate step in the assimilation by living plants of dead vegetable matter.

Apoc'rypha (a Greek word meaning 'hidden,' 'secret') seems, when applied to religious books or writings, to have been used (1) for such as were suitable, not for the mass of believers, but for the initiated only; works containing the esoteric or recondite teaching of the faith or sect; (2) works the date, origin, and authorship of which were unknown or doubtful; (3) works which claimed to be what they were not, were spurious or pseudepigraphic. When the Apocrypha is spoken of, the Apocrypha of the Old Testament is generally meant. Another large group may be called the apocryphal books of the New Testament.

The Apocrypha of the Old Testament consists of the books, or parts of books, which are found in the Septuagint or Greek version of the Old Testament, but are not in the Hebrew or Palestinian canon. The Palestinian Jews recognised only the Law, the Prophets, and such Hagiographa or sacred writings as were held to have been composed before the succession of prophets had ceased. The Septuagint, translated from the Hebrew at various dates, ultimately included a number of admittedly later works, some of them originally composed not in Hebrew, but in Greek, whose relation to the old canon was not very precisely defined. These books are: (1) First (or Third) Esdras; (2) Tobit; (3) Judith; (4) The parts of Esther not found in Hebrew or Chaldee; (5) The Wisdom of Solomon; (6) The Wisdom of Jesus, the son of Sirach, or Ecclesiasticus; (7) Baruch; (8) The Song of the Three Holy Children; (9) The History of Susanna; (10) Bel and the Dragon; (11) The Prayer of Manasses, king of Judah; (12) First Maccabees; (13) Second Maccabees. To these must be added (14) Second (or Fourth) Esdras, which is not found in the Septuagint. The more important of these are treated in separate articles. They differ much in character and value. Some show traces of Persian influence; others are mainly Palestinian in origin and spirit; others seem to have been written in Egypt, and reflect Greek or Alexandrian modes of thought. They date mainly from the period 250 B.C. to 100 A.D., and fall into three groups—historical or legendary, prophetic, and didactic or philosophical. Various as they are, the Apocrypha of the Old Testament are invaluable to the careful student of biblical literature and theology. Though manifestly inferior to the canonical books in religious power, they almost everywhere reflect the current religious views of the Jews at the time of Christ's coming, the marvellous continuity of Jewish national feeling, unbroken faith in times of trouble, and unconquerable hope in a noble and more glorious future. Theologically they mark, in some ways, a development from the old Jewish standpoint, and a distinct approximation to the thought of the New Testament; the doctrine of Wisdom, for example, which sometimes seems the personification of the Spirit of God, comes very near the *Logos* conception of the New Testament. The angelology also is nearer that of the New Testament than the Old. Prayer for the dead is sanctioned by 2 Maccabees xii.

The early Greek fathers, using the Septuagint, treated the apocryphal books very much as they did the canonical books; but from the Council of Laodicea (360 A.D.) onwards, the Greek Church had never given the 'ecclesiastical' books (as the Apocrypha came to be called) the same rank as the canonical ones. In the Western Church, Jerome and others recognised only the Palestinian canon; but Augustine gave the weight of his authority to the opposite view. While, in the middle ages, the 'ecclesiastical' books were perhaps most usually distinguished in some measure from the canonical Scriptures in authority, the Council of Trent took Augustine's view, and anathematised those who do not accept the Apocrypha contained in the Vulgate (omitting 1st and 2d Esdras, and the Prayer of Manasses) 'as sacred and canonical.' Luther held them 'not

equal to Holy Scripture, but as good and useful for reading.' The Reformed Church generally emphasised this distinction. The articles of the Church of England declare that they are to be read 'for example of life and instruction of manners,' but not 'to establish any doctrine;' but many of the parts of the Apocrypha read as lessons were excluded from the lectionary sanctioned in 1871. The Westminster Confession, and most of the non-Anglican churches in Britain and the United States, regard them as 'of no authority,' 'nor to be any otherwise approved or made use of than other human writings.' A bitter controversy in Scotland, in 1825–27, as well as in England, led to the omission of the Apocrypha from the Bibles circulated by the British and Foreign Bible Society; and the quotation from Wisdom iv. 13, 14, on the memorial to Prince Albert at Balmoral in 1862 revived debate on the subject. Many good people regard the Apocrypha, not with indifference, but with antipathy, as books that falsely claim to be part of the inspired Word of God.

Besides those actually included in the Septuagint, there were numerous Jewish apocryphal works, notably the Book of Enoch and others usually called Apocalyptic Writings (q.v.), the Psalms of Solomon, the Book of Jubilees, and others.

The apocryphal books of the New Testament stand on a different footing: no considerable part of the Christian Church has included any of them in the canon, and most of them have been always explicitly rejected as without authority, or as fabulous. But the name has been used of very different works: (1) The books which were at one time recognised in certain quarters as Scripture—e.g. the Epistle of Clement, the Didache, the Shepherd of Hermas, the Epistle of Barnabas. (2) The Apocryphal Gospels, which fall into various classes—(*a*) the Gospel according to the Hebrews, which is now recognised to have contained genuine elements, though only fragments of it remain; (*b*) Heretical Gospels, i.e. gospels written in the interests of some sect—e.g. the Gospel of Peter, fragments of which were discovered in 1892; the Gospel of the Ebionites; (*c*) the Legendary Gospels—e.g. *The Birth Gospels;* the Protevangelium of James, Pseudo-Matthew, the Gospel of the Nativity, the History of Joseph, &c.; *The Gospels of the boyhood of Jesus*—e.g. the Gospel of Thomas; *The Gospels relating to Pilate*—e.g. the Gospel of Nicodemus. (3) Apocryphal Acts—e.g. the Acts of Paul and Thecla, the Acts of Thomas, the Acts of Andrew. (4) Apocryphal Epistles—e.g. the correspondence of Jesus and Abgarus. (5) Apocryphal Apocalypses—e.g. Apocalypse of Peter (discovered in 1892), the Apocalypse of Paul. Much of this literature has been collected together in Tischendorf's volume; see translations by Cowper (1874) and by Walker in the *Ante-Nicene Library* (vol. xvi.).

The *Literature* on the Old Testament Apocrypha is far more abundant and valuable. Both the Apocrypha proper and the Apocalyptic literature are contained in the *Oxford Apocrypha and Pseudepigrapha* (1913), edited by Charles. There is a similar collection in German, edited by Kautzsch, which was published a few years earlier. The best introduction to the Apocrypha is that of Oesterley (1914). The Century Bible Handbooks contain a volume on *The Apocryphal Books* by H. T. Andrews. Among the older books may be mentioned the *Speaker's Commentary* edition of the Apocrypha by Wace. See also the literature mentioned in the articles on the separate books and on Bible.

Apocyna'ceæ, or APOCYNEÆ, a family of sympetalous dicotyledons, of about 1000 species, chiefly tropical twining shrubs and large woody lianas, but represented in Britain by the Periwinkle (q.v.), in south Europe by the Oleander (q.v.) among others. The leaves are simple, usually opposite; the flowers regular. The style has often an expanded head, with the stigmatic surface below, whereby self-pollination is prevented. The milky juice is usually poisonous, but sometimes drinkable (see COWTREE). It is a frequent source of rubber (Landolphia). Some yield indigo, and a few (Carissa, Hancornia) bear edible fruits; but the majority are poisonous, notably the Tanghin (Tanghinia), or ordeal-seed of Madagascar. Canadian hemp (*Apocynum cannabinum*) yields a strong fibre, long known to the Indians. Some Apocynaceæ are cultivated as hot-house plants, especially *Allamanda.* See DOGBANE, STROPHANTHUS.

Apocynum. See APOCYNACEÆ, DOGBANE.

Apodictic (from the Greek verb 'to prove'), a logical term signifying a judgment or conclusion which is necessarily true; or, in other words, a judgment of which the opposite is impossible. No apodictic judgment can be founded on experience.

Apo'gamy. See FERN, REPRODUCTION.

Ap'ogee (Gr. *apo,* 'from,' and *gē,* 'the earth'), properly speaking, the greatest distance of the earth from any of the heavenly bodies. Its application, however, is restricted to the sun and moon, the sun's apogee corresponding to the earth's aphelion, and the moon's apogee being the point of its orbit most remote from the earth. Apogee is opposed to perigee.

Apolda, a town of Thuringia, in the former territory of Saxe-Weimar-Eisenach, 9½ miles NE. of Weimar by rail. It is a place of much industrial activity, having extensive manufactures of hosiery, which are amongst the most important in Germany. There are also dye-works, motor-car works, machine-works, and bell-foundries. Pop. (1925) 25,703.

Apollina'ris the Younger, Bishop of Laodicea in Syria (died 390 A.D.), and one of the warmest opponents of Arianism. His father, Apollinaris the Elder, who was presbyter of Laodicea, was born at Alexandria, and taught grammar, first at Berytus, and afterwards at Laodicea. When Julian prohibited the Christians from teaching the classics, the father and son endeavoured to supply the loss by converting the Scriptures into a body of poetry, rhetoric, and philosophy. The Old Testament was selected as the subject for poetical compositions after the manner of Homer, Pindar, and the tragedians; whilst the New Testament formed the groundwork of dialogues in imitation of Plato. But it was chiefly as a controversial theologian, and as the founder of a sect, that Apollinaris is celebrated. He maintained the doctrine that the *Logos,* or divine nature in Christ, took the place of the rational human soul or mind, and that the body of Christ was a spiritualised and glorified form of humanity. This doctrine was condemned by several synods, especially by the Council of Constantinople (381), on the ground that it denied the true human nature of Christ. The heresy styled Apollinarianism spread itself rapidly in Syria and the neighbouring countries, and, after the death of Apollinaris, divided itself into two sects—the Vitalians, named after Vitalis, Bishop of Antioch; and the Polemeans, who added to the doctrine of Apollinaris the assertion that the divine and human natures were so blended as one substance in Christ that his body was a proper object of adoration. See Raven, *Apollinarianism* (1923).—Apollinaris must not be confounded with Claudius Apollinaris, Bishop of Hierapolis, in Phrygia (170 A.D.), who wrote an *Apology* for the Christian faith, and several other works, all of which are lost.

Apollinaris Water, an alkaline mineral water containing carbonate of soda, derived from

the Apollinaris Spring in the valley of the Ahr, in the Rhine province. It is rich in carbonic acid, and is popular for table use.

Apollo (Gr. *Apollōn*) may be regarded as the characteristic divinity of the Greeks, inasmuch as he was the impersonation of Greek life in its most beautiful form, and the ideal representative of the Greek nation. His mild worship, with its many festivals, accompanied as they were by a cessation from all hostilities; his various shrines at sacred places, with their oracles; and the general idea of his character, had a wide, powerful, and beneficent influence on social and political life throughout the states of Greece. Homer and Hesiod mention that he was the son of Zeus and Leto, and twin-brother of Artemis, but neither states where he was born. The Ephesians believed that he was born in a grove near their city. The most popular legend was that which made him a native of Delos, one of the Cyclades, where his mother Leto, followed by the jealous wrath of Hera over land and sea, at length found rest and shelter, and was delivered of him, under the shadow of a palm or olive tree, at the foot of Mount Cynthus. To spite Hera, who was far from being a favourite with the other goddesses, these hastened to tender their services to the weak and wearied Leto. Themis fed the young Apollo with nectar and ambrosia, the food of the gods, which seems to have suddenly excited the self-consciousness of the infant deity, as he surprised his nurse by starting to his feet, demanding a lyre, and announcing his intention of henceforth revealing to mortals the will of Zeus. The island, proud of having been the birthplace of the god, adorned itself with a robe of golden flowers.

In ancient literature Apollo is described as possessed of many and various powers, all of which, however, appear to be intimately related to each other. He is spoken of: (1) As the god of retributive justice, who, armed with bow and arrows, sends down his glittering shafts upon insolent offenders. In this character he appears in the opening of the *Iliad*. (2) As the instructor of bards, and the god of song or minstrelsy, playing upon the phorminx or seven-stringed lyre, and singing for the diversion of the other deities when engaged in feasting. (3) As the god of prophetic inspiration, especially in his oracle at Delphi. (4) As the guardian deity of herds and flocks, as in his care of the flocks of King Admetus at Pheræ in Thessaly. (5) As the god of medicine, who affords help, and wards off evil. In this sense he is represented as the father of Asclepios (Æsculapius), the god of the healing art. (6) As a founder of cities, and the spiritual leader of colonists. According to Homer, he assisted in building the walls of Troy. Cyrene, Naxos in Sicily, and other cities, venerated him as their founder. By the later writers he was identified with Helios, the sun-god, though Homer describes the latter as a distinct deity. Several critics, however, have regarded Helios, or the sun-god, as the true original Apollo —an opinion supported by many probabilities. In the Greek mythology, Apollo forms with the supreme Zeus and Athene a kind of divine triad. He is the beloved son of Zeus, the revealer of his counsel, one in mind and will with him.

The predominance of his worship, carried with them by the wide-spreading Greek colonies, who were under his peculiar care, marks a higher stage in the development of Greek religion, by which a limit was put to the polytheistic idea, and the ethical took the place of the merely physical. Apollo could only be approached with a pure heart, and self-examination was the first condition of his discipleship. It was from the Lycians that his worship came to Greece, and it was by them first that the lofty ideal of the humanisation of deity was conceived. His worship touched the glowing imagination of the Greek, and thus in Apollo, the saviour and purifier, the guide to self-control without self-mortification, Greek religion may be said to have reached the climax of its development. His oracle at Delphi inculcated a really high standard of religious life for three hundred years, and it was not till about the end of the 6th century B.C. that it began to decline. It is significant that it was the Apollo worship that won the heartiest homage of Socrates. It was to the Greek art and philosophy that it owed its development into the ideal of humanity, and it ever constituted the brightest side of the Greek mind. The most celebrated oracles of Apollo were at Delphi, Abæ in Phocis, Ismenion in Thebes, Delos, Claros near Colophon, and Patara in Lycia. One of the most common epithets for Apollo is *Phœbus* ('the bright' or 'pure'), which occurs in Homer, and later was applied to Apollo more particularly as the sun-god. Another was *Smintheus*, most probably from *sminthos*, 'a mouse,' there being a statue of the god at Chryse with a mouse under its foot, while on coins he frequently carries a mouse in his hands (see Lang's *Custom and Myth*). Among the Romans, the worship of Apollo was practised as early as 430 B.C., and prevailed especially under the emperors. But there can be no doubt that the Romans derived their conceptions of Apollo entirely from the Greeks. It was in honour of him and his sister Diana (Artemis) that the *ludi sæculares* were celebrated every hundred years. The attributes of Apollo are the bow and quiver, the cithara and plectrum, the snake, raven, shepherd's crook, tripod, and laurel; less frequently, the grasshopper, cock, hawk, wolf, and olive-tree.

In sculpture, he is generally represented with a face beautifully oval, high forehead, flowing hair, and slender figure. The most famous representation of the god is the Apollo Belvedere at Rome, a figure in which are combined the highest intellect

Apollo Belvedere.

with the most consummate physical beauty. It is supposed to be a copy of a bronze votive statue erected at Delphi, and representing the god repelling the Gauls (279 B.C.) from his shrine. From another copy, a bronze statuette at St Petersburg, known as the Stroganof Apollo, it is found to have been an ægis, not a bow, that the figure held in the left hand. The statue (upwards of 7 feet high) is naked, but a cloak fastened round the neck hangs gracefully over the extended left arm; the expression of the face is one of calm and godlike triumph, mixed with 'beautiful disdain.'

This great work of art was discovered in 1495 amid the ruins of ancient Antium, and purchased by Pope Julius II., who placed it in the Belvedere of the Vatican, whence the name it bears. The left hand and the right fore-arm, wanting in the statue as discovered, were restored by a pupil of Michelangelo.

Apollodo'rus, (1) an Athenian painter, who flourished about 408 B.C., and was the predecessor of Zeuxis. He introduced improved colouring and distribution of light and shade.—(2) An Athenian grammarian who flourished about 140 B.C., wrote a work on mythology, giving an arrangement of old myths from the earliest times to the historical period; also a geography, a chronicle in iambic verse, and several grammatical works. The account of the mythology and the heroic gods of Greece, known as the *Bibliotheca*, is the only work preserved (except a few fragments). It is a valuable work, but is reckoned by some only a later extract from a larger work by Apollodorus. See Frazer's edition, with translation, &c. (1921).—(3) Another Apollodorus was a celebrated architect in the time of the Emperor Trajan, by whom he was employed to construct a bridge over the Danube in Lower Hungary. He was sentenced to death in 129 A.D. by Hadrian, offended at his fearless criticism of a temple designed by the emperor himself.

Apollo'nius. (1) APOLLONIUS OF RHODES (born in Alexandria about 240 B.C., but long resident in Rhodes) wrote many works on grammar, and an epic poem entitled the *Argonautica*, marked rather by learning and industry than by poetical genius, though it contains some truly artistic passages, such as those exhibiting the growth of Medea's love. It was greatly admired by the Romans, was translated into Latin by Publius Terentius Varro, and was imitated in a wholesale manner by Valerius Flaccus. There are editions by Merkel (1854), Seaton (1888), and Mooney (1913).—(2) APOLLONIUS OF PERGA, who flourished 250–220 B.C., is classed with Euclid, Archimedes, and Diophantus among the founders of mathematics. His work on conic sections has been preserved, partly in the original Greek, partly in an Arabic translation. He not merely summed up all that was then known on the subject, but made many valuable discoveries.—(3) APOLLONIUS OF TY'ANA in Cappadocia, born three or four years before the Christian era, was, according to Philostratus, a zealous teacher of the neo-Pythagorean doctrines, who claimed a commission from heaven to teach a pure and reformed religion. He soon collected a considerable number of disciples, travelled through a great part of Asia Minor, and ultimately made his way to India, in order to become acquainted with the doctrine of the Brahmins. On this journey he stayed for a time in Babylon, was introduced to the Magi, and at last reaching the court of King Phraortes, in India, made the acquaintance of the most notable Brahmins. When he returned from this pilgrimage, his fame as a wise man was greatly increased; the people regarded him as a worker of miracles and a divine being, and princes were glad to entertain him at their courts. He himself seems to have claimed insight into futurity, rather than the power of working miracles. He was patronised by Vespasian, and followed him to Egypt. After extensive travels in Spain, Italy, and Greece, he was accused of having conspired with Nerva against Domitian. Ultimately, he appears to have settled in Ephesus, where he opened a neo-Pythagorean school, and continued his teaching until he died, nearly one hundred years old. His history was not written till more than a hundred years after his death, by Philostratus (q.v.). It contains a mass of absurdities and fables, through which an outline of historical facts and the real character of the man are perhaps discernible. After his death, he was worshipped with divine honours, temples were built to him, coins struck in memory of him. The English freethinker Charles Blount, and Voltaire, wrote to prove the similarity or superiority of Apollonius to Christ. Baur's theory is that Philostratus invented most of the story of Apollonius as a heathen saviour, simply to be a counterpart and rival to Christ. See Froude's *Short Studies*, and works by Whitaker (1906), Groves Campbell (1908), and Conybeare (1912).—(4) APOLLONIUS, surnamed DYSKOLOS (or 'ill-tempered'), of Alexandria, lived in the 2d century. Some of his grammatical works were edited by Bekker. He was the first who reduced grammar to a system. His reputation was so high that Priscian calls him *grammaticorum princeps* (the prince of grammarians), and follows him somewhat closely.

Apollo'nius OF TYRE, the hero of a Greek metrical romance, very popular in the middle ages. It relates the romantic adventures of Apollonius, a Syrian prince, as well as those of his wife, who was parted from him by apparent death, and his daughter, and closes with the happy reunion of the whole family. The original no longer exists; but there are three very early Latin versions, of which one was published by Welser (Augsburg, 1595); another is to be found in the *Gesta Romanorum*, and the third in the *Pantheon* of Godfrey of Viterbo. From this Latin source have proceeded the Anglo-Saxon version of the 11th century (ed. by Zupitza, 1896), the Spanish version of the 13th century, and several French and Italian versions in prose and verse of the 14th and 15th centuries. Shakespeare treated the subject in his drama of *Pericles*, mainly following the version of Gower in his *Confessio Amantis*, itself based on the *Pantheon* of Godfrey of Viterbo. The romance was rendered into German, probably from the *Gesta Romanorum*, by a Vienna physician, 'Heinrich von der Neuenstadt,' about 1300, in a poem of 20,000 lines (ed. Singer, 1906). A hitherto unknown Middle German prose version of the story was edited by Schröter in 1872. Simrock narrates the story as it is given in the *Gesta Romanorum*, in his *Quellen des Shakespeare* (1872). See Hagen, *Der Roman vom König Apollonius* (1878); Klebs, *Die Erzählung von Apollonius aus Tyrus* (1899).

Apollos, an Alexandrian Jew, described in the Acts of the Apostles as an eloquent man, and mighty in the Scriptures, knowing only the baptism of John, who on coming to Ephesus (54 A.D.) was more perfectly taught by Aquila and Priscilla. He was a distinguished fellow-labourer of the apostle Paul, and in Corinth was especially successful as a Christian teacher, insomuch that a party in the church called themselves by his name (1 Cor. iii. 4). By many he has been regarded as the author of the Epistle to the Hebrews.

Apollyon (Gr., 'the destroyer'), or ABADDON. See ASMODEUS.

Apologetics (a word derived from Gr. *apo*, 'from,' and *logos*, 'speech'—something spoken to ward off an attack) technically denotes that branch of theology which is concerned with the defence of Christianity. The term was taken over from common Greek usage. The *Apology of Socrates*, for instance, is the title of the book containing the speech which Socrates made before the Athenian court in self-defence. Newman's *Apologia pro Vita Sua* is another illustration of the use of the term in its technical sense.

As a distinct branch of theological science, apologetics cannot be dated back before the 18th century, though of course a vast number of 'Apologies'

were written in the preceding centuries. Christianity was put upon its defence from the very earliest period of its existence, and in 1 Peter iii. 15 it is said to be the duty of every Christian to be 'ready always to give answer to every man that asketh you a reason concerning the hope that is in you.' Many of the New Testament books were written in defence of the faith, and are therefore entitled to be called 'Apologies.' The fourth gospel, for instance, was written to prove that 'Jesus is the Christ, the Son of God' (xx. 31). The purpose of the Epistle to the Hebrews was to demonstrate the superiority of Christianity to Judaism. Even the Acts of the Apostles is claimed by some scholars as an 'Apology,' because the writer throughout seems to be insisting upon the right of Christianity to exist in the Roman empire.

The 2d and 3d centuries produced many very important Apologies. The earliest was the recently discovered *Apology of Aristides*, written in the reign of Hadrian (*c.* 130). One of the best known of the Apologies is that of Justin Martyr (*c.* 150); while Tertullian's still more famous *Apologeticus*, perhaps the finest specimen of its kind, is one of the most notable defences of the faith ever produced. Less important works are the Apologies of Quadratus, Minucius Felix, Athenagoras, and Melito. The attack of Celsus on Christianity called forth a notable reply from Origen (250), and the criticisms of the Neo-Platonists, headed by Porphyry, were met by Eusebius of Cæsarea and Theodoret. Augustine's *City of God* was written as a reply to the taunt that the downfall of the Roman empire was due to the corruptions introduced by Christianity. In the scholastic period valuable contributions were made to the subject by Anselm (the inventor of the ontological argument), Abelard, and Thomas Aquinas. The wave of scepticism which followed in the wake of the Reformation in the 17th century produced two well-known books, the *De Veritate Religionis Christianæ* of Hugo Grotius, which may be said to have laid the foundation of the science of apologetics, and Pascal's *Thoughts*. It was in the 18th century, however, that the real formulation of the science of apologetics took place. The challenge to Christianity which came from the Deistic movement in England, and the *Aufklärung* or Illumination on the Continent, compelled the leaders of the Christian Church to marshal the arguments in defence of their position. Many treatises of value were produced, some of which have become Christian classics—e.g. Butler's *Analogy*, Paley's *Natural Theology* and *Evidences of Christianity*, the *Bridgewater Treatises*, &c. In the 19th century the growth of natural science led to an outburst of materialism, and necessitated the restatement of the Christian argument. The discovery of the law of evolution, for instance, compelled Christian apologists to reconsider and remodel the teleological argument which had come to the front in the 18th century mainly through the influence of the *Bridgewater Treatises*. The discoveries made by Biblical criticism, and the abandonment of the old doctrine of verbal inspiration, revolutionised the treatment of the Bible in apologetic. Our extended knowledge of other religions, and the development of the science of comparative religion, raised a new set of problems which claimed treatment at the hand of the Christian apologist. The development of modern philosophy, too, after the revolution introduced by Hume and Kant, raised the question as to the ultimate basis of truth, and forced the defender of the Christian faith to grapple with the issue.

It will thus be seen that the science of apologetics is always relative to the age. The defence varies with the attack. Every new scientific discovery, for instance, is regarded as a challenge to religion, and the challenge has to be taken up. The apologetic of one age may be futile in another. The argument from prophecy was the sheet-anchor of the Christian defence in the early centuries; to-day it occupies a subsidiary position. Paley regarded the miracles of Jesus as the grand proof of the truth of Christianity. The modern mind is accustomed to regard miracles as a burden to faith rather than as its chief prop and support.

Modern apologists may be divided into two classes: (*a*) Those who, like Ritschl, are Christocentric, and hold that it is the appeal which Christ makes to the soul that guarantees the truth of Christianity. From this appeal we derive our knowledge of God and all the other truths which form the heart and soul of the Christian faith. (*b*) Those—and they form the majority—who are Theocentric and start with the conception of God, and obtain the essential Christian ideas either as a natural corollary or an additional revelation. The difference between these two schools of thought corresponds to the distinction which was drawn in the 18th century between 'Natural Theology' and 'Revealed Theology.' The problem really is, can the mind reach the conception of God apart from a divine revelation? The particular difficulties which those who offer an affirmative answer to this question have to meet lie mainly in the realm of philosophy. The principle of the relativity of knowledge, first introduced by Kant (though it was transcended by him), limits knowledge to the region of experience, and says with Tennyson that 'knowledge is of things we see.' This position is claimed as the basis and justification of agnosticism. The Theistic reply takes several lines. It admits that knowledge is limited to experience, but denies that experience is confined to sense-perception; or it claims that man, in addition to his intellectual organs, possesses a religious organ as well, which is capable of transcending the limits that otherwise hem him in; or, thirdly, it boldly challenges the principle itself, and asserts that every act of knowing transcends the limitation, and that unless the principle is transcended no knowledge is possible. Having demolished the attack, the Theistic argument develops the positive argument. Different thinkers prefer different lines of thought. Kant, for instance, laid the main stress on the 'moral argument,' and argued that the facts of the moral life, and especially the 'categorical imperative,' cannot be explained apart from the assumption of the existence of God. J. Caird, following Hegel, held that God is equally the implicate of epistemology, and apart from him the dualism of the universe cannot be resolved. Martineau combined the 'moral argument' with the cosmological—i.e. the argument which claims that the origin of the universe cannot be explained apart from God. Ward, in his *Naturalism and Agnosticism*, which is the most effective and trenchant criticism of the modern sceptical attitude, and his *Realm of Ends*, has developed and restated the teleological argument, which finds in the conception of God the final cause of the universe.

The problems which confront the apologist of Christianity proper are still more numerous. They are partly literary and historical. How far can we trust the narrative in the New Testament? This of course raises the question of the New Testament canon, the date and authorship of the books, the mutual relation of the gospels, and the historical value of the records. The problem is now far more complex than it used to be. A few years ago the apologist considered that if he had proved to his own satisfaction the Johannine authorship of the fourth gospel his work was done, and the narrative

could be used without question. We realise now that such a position is untenable. Authorship and date do not settle everything, and the ordinary canons of historical research have to be applied to the narrative. Nevertheless, after the most rigorous criticism, we are still confronted by the fact of Christ; and it is upon the fact of Christ, the impression which he made upon his contemporaries and the impression which his portraiture in the gospels has made upon each succeeding generation, the moral influence which he exerted upon the world, the uniqueness of his character, his victory over sin and death—it is upon facts such as these that the modern apologist lays the emphasis and raises the superstructure of his defence of Christianity. The two most typical and comprehensive modern books on apologetics are those of Bruce (1892) and Garvie (1914).

Ap'ologue, a fable, parable, or short allegorical story, intended to serve as a pleasant vehicle for some moral doctrine, as that of the 'Belly and the Members,' related by the patrician Menenius Agrippa, in the second book of Livy. The name is applied more particularly to a story in which the actors or speakers are animals or inanimate things. It is identical with the classical *fable*, though it may perhaps be somewhat more complex and sustained than is possible in this form. The New Testament *parable* is a simpler kind of apologue, the incidents of which are necessarily probable. Æsop's fables have enjoyed a world-wide reputation. Luther held such an opinion of the value of the apologue as a vehicle of moral truth, that he edited a revised Æsop, for which he wrote a characteristic preface.

Apomor'phia is an alkaloid prepared from morphia by heating with hydrochloric acid. It is a rapid and powerful emetic, but its effects quickly pass off; and it causes very little depression. Its chief value depends upon the ease with which it can be administered by Hypodermic Injection (q.v.), as vomiting can thus be induced even when swallowing is difficult or impossible—e.g. in cases of poisoning.

Aponeuro'sis (Gr. *apo*, 'from,' and *neuron*, 'a string') is an anatomical term for an expansion of strong fibrous tissue, of which there are many examples in the human body. It is generally confined to expansions from the tendons of muscles, as the lumbar aponeurosis. If a tendon be very broad and expanded, as that of the external oblique muscle of the abdomen, it is said to be aponeurotic. Some muscles, as those on the shoulder-blade, are partially covered by a tendinous expansion (or aponeurosis), to which some of their fibres are attached. In some places aponeuroses form protections over large arteries.

Aponogeton. See LATTICE-LEAF, AQUATIC PLANTS.

Ap'ophthegm, a terse, pithy saying, putting an important truth in a few words. More short, pointed, and practical than the Aphorism (q.v.) need be, it aims at a vivid impression. Examples are—'God helps them that help themselves'; Dr Johnson's 'Patriotism is the last refuge of a scoundrel.'

Ap'oplexy (Gr. *apoplēxia*—from *plēssō*, 'I strike'—'disablement from a stroke'), a term used in medicine, from early times, of any sudden and unaccountable loss of consciousness, and still popularly employed in much the same way. Apoplexy is in the great majority of cases due to rupture of a blood-vessel in the brain. It is an error to speak of 'apoplexy' in reference to hemorrhages into other organs, as is sometimes done in medical textbooks in such expressions as 'pulmonary apoplexy.' Apoplexy may also be due to embolism (i.e. lodgment of a circulating clot) in a vessel of the brain, or to thrombosis (i.e. gradual clotting of the blood) in these vessels. Milder cases, from which, as a rule, recovery takes place quickly and completely, are due to minor derangements of the cerebral circulation associated with spasm of the arteries of supply to parts of the brain.

Apoplexy is commonly a disease of advanced life, being very rarely met with below the age of forty. The most important causes which predispose to apoplexy are Atheroma and minute Aneurisms (q.v.) in the brain (see ARTERIES, *Diseases of*), and chronic Bright's Disease (q.v.), which produces great increase in the general pressure of the blood within the vessels. At one time much more importance was attached than now to a thick-set, short-necked habit of body in this connection. Men are more liable to apoplexy than women. A severe *apoplectic fit* or *shock* may come on suddenly or gradually; in either case the patient loses sensation, motion, and consciousness, and lies with flushed face, full slow pulse, and noisy 'stertorous' breathing. If death occur, a clot of blood may be found in the substance or upon the surface of the brain, with the ruptured artery from which it has escaped. If the shock be not fatal, the patient gradually recovers consciousness; and it is found then, if not before, that there is Paralysis (q.v.), partial or complete, of one side of the body. In the course of days or weeks this may pass off, but rarely disappears completely. Mental enfeeblement, as well as bodily, may result. Less severe shocks of apoplexy often occur, with no unconsciousness, but only paralysis, partial or complete, of one side of the body. The approach of apoplexy is often heralded by *premonitory symptoms*—e.g. temporary confusion of thought or loss of memory, giddiness, headache, difficulty of speech, weakness in a limb, double vision; and when these occur, prompt medical treatment, especially attention to regular action of the bowels, may occasionally avert the threatened apoplexy. When a shock of apoplexy has occurred, the patient must be kept lying perfectly quiet, with head raised, and cold applied to it. Medicines which tend to check hemorrhage, as ergot, may be administered, but their use is doubtful, as they raise the general blood-pressure. Purgatives may be given, and bleeding is often valuable. Alcohol is dangerous, and should on no account be used unless by express direction of a medical man. A person who has had one shock of apoplexy is always liable to a recurrence.

Fits, called *apoplectiform attacks*, met with in other brain diseases—e.g. tumours, general paralysis—closely resemble apoplexy. The condition of a patient suffering from Epilepsy (q.v.), uræmia (see KIDNEYS, *Diseases of*), or narcotic poisoning—e.g. by opium or alcohol—may be very difficult to distinguish from apoplectic unconsciousness. Hence the great importance of caution in dealing with a person found unconscious, lest he be treated, to his imminent peril, as merely drunk, when really suffering from severe apoplexy.

Heat-apoplexy is Sunstroke (q.v.).

Apos'pory. See FERN, REPRODUCTION.

Apostate literally designates any one who changes his religion, whatever may be his motive; but, by custom, the word is always used in an injurious sense, as equivalent to one who, in changing his creed, is actuated by unworthy motives. In early Christian times, the word was applied to those who abandoned their faith in order to escape from persecution; but it was also applied to such as rejected Christianity on speculative grounds (the Emperor Julian, for instance). The apostates in times of persecution were styled variously Sacrificati, Thurificati, &c., according to the modes in which they publicly

made known their return to heathenism, by offering sacrifices or incense to the gods of Rome. Controversies arose in the early church as to the readmission of those who had so lapsed (see LAPSED and NOVATIAN). The Roman Catholic Church at one period imposed severe penalties on apostasy. The apostate was naturally excommunicated; but sometimes also his property was confiscated, and he himself banished, or even put to death. The term is also applied, not only to those who become converts to Mohammedanism, usually called *renegades*, but to such as exchange the Roman Catholic for the Protestant faith, and *vice versâ*. It has often had great influence on the fortunes of a nation that a prince has apostatised. The most renowned instance in modern history is that of Henry IV. (q.v.), who became a Roman Catholic for peace's sake.

A posteriori reasoning is reasoning from experience, or *backwards* from effect to cause. See A PRIORI.

Apostle (Gr. *apostolos*, 'one sent forth'), a messenger, but especially used to denote the twelve disciples whom Jesus sent forth to preach the gospel—twelve probably because there were twelve tribes. Their names were Simon Peter, Andrew, John (the son of Zebedee), James (his brother), Philip, Bartholomew, Thomas, Matthew (identified with Levi), James (the son of Alphæus), Thaddæus, Simon, and Judas Iscariot. (The lists in Matt. x., Mark iii., Luke vi., and Acts i., are the same, with the exception that for Thaddæus in Matthew and Mark, we have Judas in Luke and Acts.) Peter and Andrew and James and John have a certain pre-eminence; and Peter and the two sons of Zebedee enjoyed a special measure of their master's love and confidence. The apostles were mainly men of very humble rank, distinguished rather by their character and religious zeal, than by intellectual ability or special training. Subsequently, Matthias was chosen in the room of Judas; and still later, Paul was called to the apostleship. The apostles were twice commissioned to go forth on their work of evangelisation; first during the Galilean ministry, when their labours were restricted to the Jews. The second time was shortly before the Lord's ascension, when they were sent to 'teach all nations, baptising them in the name of the Father, and of the Son, and of the Holy Ghost.' On the day of Pentecost, the apostles received miraculous gifts. It has been held that it was as essential to their office that they should have seen the Lord (1 Cor. xv. 8); that they were inspired (John xvi. 13; Gal. i. 11, 12); and that they had the power of working miracles (2 Cor. xii. 12). Scripture tells nothing about the later life or labours of most of them, and there is no historical foundation for the tradition that the first apostles divided the then known world between them, and that all save St John died a martyr's death. Early tradition, however, connects Philip with Phrygia, Thomas with Parthia, Andrew with Scythia, Bartholomew with India. When controversy arose about the relation of the church to the heathen world, Paul 'the apostle of the Gentiles,' spoke of the office of Peter, as 'the apostleship of the circumcision' (Gal. ii. 7–9). The church did not maintain the office of apostle in its ministry, though it has been contended that the office of the Bishop (q.v.) represents it. The see of Rome calls itself apostolic, as having been occupied by St Peter. The Catholic Apostolic Church has revived the title of apostle. It is also usual to speak of the founder of the Christian Church in a country as the apostle of that country; thus, Gregory is the apostle of Armenia; Boniface, of the Germans; Augustine, of the English; St Patrick, of Ireland; Columba, of the Scots; Cuthbert, of Northumbria; St Francis Xavier, of India; and, more recently, Eliot is spoken of as the apostle of the Indians.

Apostles, TEACHING OF THE TWELVE, or DIDACHÊ (Gr., 'teaching'), is a treatise discovered by Bryennios, metropolitan of Nicomedia, and published by him with a Greek commentary (Constantinople, 1883). In sixteen short chapters it describes the two ways of life and of death, the method of divine service, baptism, fasting, prayer, the eucharist, and the ministry in the early church. The ministers are distinguished as permanent or itinerant, bishops and deacons belonging to the former, and prophets and teachers to the latter class. It had previously been suggested that some such document must underlie the seventh book of the *Apostolic Constitutions* (q.v.); and there is certainly a very close connection between this and the eighth book and the treatise. The work is moral rather than dogmatical in tone, and is of great interest for the history of the early Christian Church; but it throws no fresh light on the New Testament canon, and does nothing to settle the Johannine origin of the fourth gospel. The first part of it is probably based on a Jewish manual, *The Two Ways*, introduced into the Christian Church for catechumens. The second part quotes largely from the *Epistle of Barnabas;* so that while the first part dates from the first century, the second can hardly be put before 120 A.D. Within five years of the publication of the original, some 200 treatises, books, and articles on it had appeared. See Harnack's *Apostellehre* (1887), monographs by Taylor (1886) and Rendel Harris (1887), Lightfoot's *Apostolic Fathers*, and Bartlet in Hastings's *Dictionary of the Bible.*

'Apostles' Club, a literary association at Cambridge University in the third decade of the 19th century, which at various dates included amongst its members Tennyson, A. H. Hallam, Trench, Monckton Milnes, Charles Buller, Helps, Spedding, the Lushingtons, Thirlwall, Venables, Merivale, and other men of ability.

Apostle Spoons, silver spoons whose handles ended in figures of the apostles, a common baptismal present in the 16th and 17th centuries.

Apostol'ic, or APOSTOLICAL, the general term applied to everything derived directly from the apostles, or bearing their character. Either case constitutes apostolicity. The Roman Catholic Church declares itself the Apostolic Church, and the papal chair the apostolic chair, on the ground of an unbroken series of Roman bishops from the chief apostle, Peter. The Church of England, in virtue of regular episcopal ordination from the pre-reformation church, claims to be apostolic; so likewise do the Protestant Episcopal Churches in Scotland and the United States. Apostolic Tradition claims to have been handed down from the apostles themselves. In the same special sense, the name of Apostolic Council belongs to the conclave of the apostles at Jerusalem (Acts, xv.), about the year 50 A.D. Certain congregations or churches, also, which were the special scenes of the labours of the apostles, bore this title for centuries, more especially those of Jerusalem, Antioch, Alexandria, and Rome. But with the ever-increasing spiritual power of the Roman hierarchy, the name came to be more and more exclusively applied to Rome. Hence the term Apostolic See—i.e. the see of Rome; Apostolic Blessing, the blessing of the pope as the successor of St Peter; Apostolic Vicar, the cardinal who represents the pope in extraordinary missions; Apostolic Chamber, a council intrusted with the care of the revenues of the see of Rome. Apostolic Majesty is a title

conferred by the pope on Stephen, the first king of Hungary, and retained by his successors till the revolution. A papal brief or letter is styled apostolic in the same sense.—APOSTOLICITY, a term employed to denote that a church possesses the teaching of the apostles. The Roman Catholics use the term as expressing their claim that their church was founded by St Peter.

Apostolical Succession is a phrase used to denote one or both of *two* things—the derivation of holy orders by an unbroken chain of transmission from the apostles, and the succession of a ministry so ordained to the powers and privileges of the apostles. The theory of the Catholic Church is that its present bishops have the right to ordain in virtue of being the representatives of the apostles, who in their turn represented the Lord himself, the fountain of all grace; and further, that the Lord committed this right or power to his apostles only, that it might be transmitted to all future ages of the church through them, next through bishops ordained by them, then by their successors in regular order. The scriptural argument is mainly based on such passages as Matt. xviii. 18. Opponents of this theory maintain that these words of institution had no such special significance; that, moreover, history shows that God did not take means to preserve such a succession in his church, for it was not till the 4th century that the church officers became a separate class, and in early stages of its history, laymen, as well as church officials, could teach or preach, baptise, celebrate the eucharist, exercise discipline, and perform all special functions now considered valid only if performed by a priest ordained by a bishop in regular succession. They maintain, moreover, that ordination meant merely appointment or admission to office, that no writer of the first two centuries either states or implies that those ordained had any exclusive powers, and that the facility with which ordinations were made and unmade strengthens this inference. The rite now considered essential—the laying on of hands—in ancient times was not universal, and therefore could not have been a necessary element in ordination, being regarded merely as a symbol or accompaniment of prayer, without any special signification. See BISHOP, ORDERS, PRIEST; and on the destructive side of the argument, Hatch's able work, *The Organisation of the Early Christian Churches* (the Bampton Lectures for 1880). See also the Dissertation on 'The Christian Ministry' in Lightfoot's edition of St Paul's *Epistle to the Philippians* (1868), where it is proved that though the episcopate was developed within the last thirty years of the first century, and cannot be dissociated without violence to historical testimony from the name of St John, yet the power of the bishops was at first merely a question of practical convenience, entirely unconnected with sacerdotalism, which was not implied in the term 'clerus,' either by Clement, Ignatius, Polycarp, Justin Martyr, Irenæus, or any father until Tertullian, and even by the latter was qualified by his assertion of an universal priesthood in believers. Lightfoot proves that sacerdotal views were due to Gentile influences, but found support in Old Testament analogies, and that Cyprian was the first to make those sacerdotal assumptions for the clergy which have since become so prevalent within the Catholic Church.

Apostolic Brethren, the name given in Italy, towards the end of the 13th century, to a sect which opposed the worldly tendencies of the church. Its founder was Segarelli, a weaver in Parma, who went about Italy preaching repentance and the need of a return to the mode of life of the apostles, including the primitive community of goods. After twenty years of undisturbed activity and growing influence, the movement was condemned by popes Honorius IV. and Nicholas IV., and, in 1300, Segarelli perished at the stake, with many others, both men and women. Dolcino, a more energetic and cultivated man, now headed the orphan sect, and fortified a mountain near Vercelli; but after a gallant defence, compelled by famine to submit, he was tortured, and burned at the stake (1307).—A Gnostic sect of the 3d century took the same name; as also a body of persons near Cologne in the 12th century.

Apostolic Constitutions and **Canons,** both ascribed by tradition to Clemens Romanus, are notes of ecclesiastical customs held to be apostolical, written in the form of apostolic precepts. The *Constitutiones Apostolicæ*, consisting of eight books, were probably composed in Syria, and contain, in the first six books, a comprehensive rule for the whole Christian life. These are founded on the *Didaskalia Apostolorum*, which was probably written about the middle of the 3d century; while the seventh book, with the eighth, is thought to be founded on the *Teaching of the Twelve Apostles* (see above). The *Constitutiones* may belong to the 4th century. The eighth book was put together for the use of priests, and relates only to the sacred offices. Interpolations, however, were afterwards introduced. The *Canones Apostolici*, which were also recognised by the church, were composed at a later period. The first fifty, compiled probably in the 5th century, and translated from Greek into Latin by Dionysius the Younger, were alone acknowledged by the Latin Church. The Greek Church, on the other hand, accepted the thirty-five canons put forth, according to some, in the beginning of the 6th century; and this became a point of discord between the churches. Both collections were probably looked upon at first as apostolic traditions merely, but later came to be looked upon as due to the apostles themselves. See Bunsen's *Hippolytus*.

Apostolic Fathers, the name given to the immediate disciples and fellow-labourers of the apostles, and, in a more restricted sense, to those among them who have left writings behind them. Those specially so called are Barnabas, Clement of Rome, Ignatius, Hermas, and Polycarp. Papias of Hierapolis is also included by Irenæus, but this is probably an error. The writings of the apostolic fathers, as to their form and subject, may be looked upon as a continuation of the apostolic epistles, though far inferior to them in spirit. Their main purpose is to exhort to faith and holiness before Christ's coming again.—Editions of the apostolic fathers were published by Cotelerius (Par. 1672), Jacobson (Oxford, 1838), Hefele (1839), Dressel (1857), Gebhart, Zahn, and Harnack (1875–78), Lightfoot (incomplete, with English translation, 1877–85; smaller ed. completed by J. R. Harmer, 1891); and one, with an English translation, was begun in 1912 by Kirsopp Lake (Loeb Classical Library). There is another English translation in Clark's *Ante-Nicene Library*. See Donaldson's *Apostolic Fathers* (1874); also FATHERS OF THE CHURCH, and the articles under each name.

Apothecary, the name formerly given in England and Ireland to members of an inferior branch of the medical profession. Many were persons practising without any license; but the licensed apothecary frequently kept a shop in which he sold drugs and made up medical prescriptions, in this respect competing with the chemist and druggist. But he was entitled to attend sick persons, and prescribe for them. The term apothecary is still a legal description for licentiates of the Apothecaries' Society of London

(under the Apothecaries Acts of 1815 and 1874), or of the Apothecaries' Hall of Ireland. In Scotland there never was a class corresponding to the English apothecaries. See CHEMISTS AND DRUGGISTS; and Barrett's *History of the Apothecaries of London* (1905).

Apotheosis, the raising of a mortal to the rank of a god, is only a particular case of spirit-worship and of ancestor-worship—a special application of the animistic principle. The belief in the immortality of the dead is at once its cause and the condition of its being granted. The honours paid to the Chinese philosopher Confucius present the only example of a pure apotheosis, without any admixture of mythological elements. Apotheosis has had greater influence on political order than on religious conceptions. It has been the instrument of theocracy and of monarchy, the foundation of the divine right of kings. Born of the worship of the dead, it rapidly degenerated into the adoration of the living. Over all the world, sorcerers, chiefs, kings, and conquerors have turned to account this logical consequence of animism. The Peruvian of Pizarro's time, the Chinese, the Japanese, have their sacred kings, sons of the sun or moon. In Egypt the Pharaohs and the Ptolemies took their place at the same moment on the throne and on the altar. Alexander declared himself the son of Ammon, and insisted at last on the same honours as were due to his divine parent. At Rome the apotheosis of the Æneas of fable, and of the legendary Romulus, was but the prelude to that of Cæsar. Augustus in his turn became a god; while declining the adulations of the senate, he let himself be deified everywhere except at Rome. In every kingdom temples sprang from the ground, and colleges of priests were instituted for the service of the new deity, whose praises were chanted in unison by Virgil, Horace, and Ovid. Nor was sincerity awanting to that enthusiasm. At the end of frightful civil wars, the world hailed the era of peace. Augustus was quick to see the political advantage of this universal idolatry. It linked the whole empire together, the sacred person of the emperor becoming the guarantee for all its institutions. The cult was assiduously spread, and when once it was linked to the fundamental worship of mankind, that of ancestors, manes, lares—the most tenacious form of animism, particularly dear to the Romans—it proved too strong even to be weakened by the vices and folly of a Caligula or a Nero, or the outrage of an imperial decree requiring divine worship also for a Poppæa or an Antinous. An analogy has been pointed out between apotheosis and the canonisation decreed by Christian pontiffs; and traces of the Roman usage survive in the inveterate notion in the monarchies that grew out of the ruins of the old Roman empire, of the 'divinity that doth hedge a king,' extended even to every head that wore a crown. By none was it claimed with more perverse and fatal tenacity than by some of the least godlike of our English kings.

Appalachians, a great mountain-system of North America, nearly parallel with the Atlantic coast, named from the Appalaches, a local Indian tribe, and extending from the Gulf of St Lawrence SSW. to the west central portion of Alabama. It is the parent of many of the rivers of the Atlantic States; but several large streams break its continuity; and one, the river Hudson, is a tidal channel which carries even sea-going vessels through the range, a phenomenon very unusual in any part of the world. The Appalachians consist, in the main, of various parallel ranges, separated by wide valleys. Locally, the Appalachians have various names—e.g. the Green Mountains of Vermont, the Catskills, the Smoky Mountain Ridge of North Carolina and Tennessee; and west of the South Mountain of Pennsylvania the great Alleghany Ridge (see ALLEGHANY MOUNTAINS) often gives name to the whole system. Their highest points occur in North Carolina, where Mitchell's Peak reaches the height of 6688 feet. Coal is widely distributed, and the entire anthracite field and part of the bituminous field of Pennsylvania and other states lie in the range. Of metals, by far the most important is iron; but gold occurs in small quantities, and zinc, lead, and others are found.

Appalachico'la, a river formed by the junction of the Chattahoochee with the Flint, in Georgia, flows through Florida into the Gulf of Mexico.—APPALACHICOLA is also a cotton-shipping seaport on the river.

Appanage is not an English legal term, but in France of old it signified the assignment or conveyance by the crown of lands and feudal rights to the princes of the royal family, that they might be enabled to maintain themselves according to their rank. In England, the duchy of Cornwall may be said to be an appanage of the Prince of Wales.

Apparitions. In all ages of the world and amongst all races of the earth men have claimed to see, sometimes in broad daylight, sometimes in the darkness of the night, phantasms of human shape, of animals, or of spiritual beings, appearing without material cause, and vanishing as mysteriously as they came. Amongst primitive races at the present time the reports of travellers and anthropologists show that these phenomena are of occasional occurrence, as they are also among civilised men. They have without doubt played an important part in the religious history of the race. For upon the occurrence of these phantasms, coupled with the evidence derived from dreams, delirium, and the pseudo-possession of epilepsy, the belief in a spiritual world amongst primitive races appears to be founded (see ANIMISM). In medieval times apparitions of spiritual beings—angels or devils—appear to have been not infrequent, as we may read in the lives of the saints. Even Luther is reported to have thrown his ink-bottle at an apparition of the devil in the Wartburg at Eisenach. The appearance of the Virgin at Lourdes is an instance in modern times. The late Dr F. G. Lee assured the present writer that when he was preparing one of his books on ghosts he was repeatedly assailed in his study by demons in the shape of monstrous animals. In the witchcraft trials of the middle ages the devil or his ministers are reported as appearing to the witch, sometimes *in propriâ personâ*, sometimes in the shape of various animals—dogs, cats, toads. Bystanders, and especially the bewitched persons, claim occasionally to have seen these familiar spirits or the ghostly figure of the witch herself. The evidence, however, in most of these cases is quite untrustworthy. The witch's own confession was generally wrung from her under torture, or in England, where torture was illegal, after enforced sleeplessness and starvation, or threats which were equally effective. The desired confession would be put into her mouth, and in her enfeebled state of mind and body a suggestion of this kind would be liable to give rise to a false belief in the mind of the unhappy victim herself. As regards the other witnesses, the testimony was frequently given long after the event, or it proceeded from professional, and therefore interested, witnesses, such as Matthew Hopkins, the well-known witch-finder. It seems probable, however, in a few cases (see, for instance, the evidence of John Sterne, gentleman, at the trial of the Chelmsford witches in 1645), that apparitions were actually seen by the witnesses

and, it is likely enough, by the witch herself. Witchcraft has survived into modern times in the form of what are called 'Poltergeist' manifestations, the cases occasionally reported in which children or hysterical servant-girls surreptitiously ring bells and throw about the kitchen crockery. In a few fairly well authenticated cases the prime agent has claimed to see a human apparition. The evidence of disinterested witnesses is more credible; see, for instance, the curious apparitions reported by some of the witnesses in Mary Jobson's case (*The Miraculous Case of Mary Jobson*, by Dr Reid Clanny, F.R.S., 1841).

Within the last two or three centuries, however, as the belief in direct spirit intervention has waned, apparitions of angels or demons have almost ceased in Protestant countries. Out of 1112 recent apparitions described in the census instituted by the Society for Psychical Research (see the table below) only twelve represented angels or religious subjects, and only thirty-three were described as 'grotesque, horrible, or monstrous.' Another form of apparitions has taken their place—phantasms of the human figure, often representing the dying or the dead. Cases of this kind were recorded, indeed, in classical times. There is a well-known story of a death-warning related by Cicero (though the figure in this case seems to have appeared only in dream). But they have assumed more prominence since the Reformation, and are not infrequently reported as occurring at the present day.

Such then, briefly, are the alleged facts with which we have to deal. To the medieval, as to the ancient, world there seemed but two alternatives—to deny the facts, or to accept the conclusion that the spirits of angels and devils or of dead men and women could show themselves to mortals. The progress of science has relieved us from the awkward dilemma. We need no longer impugn the veracity of the ghostseers; nor are we, on the other hand, compelled to accept the statement of their alleged experience as evidence constraining us to accept their belief. Their ghosts are of the stuff that dreams are made of; they are in technical language Hallucinations (q.v.). Modern psychophysiology has taught us that the act of perception is an extremely complex one, in which the mind frequently plays a more important part than the senses. When we see anything—a table, or the figure of a friend—the perception, the picture presented to consciousness, is by no means a simple replica of the image impressed on the retina by the rays of light. The senses furnish only the raw material, which the mind, by means of associated ideas, works up into a finished picture. Thus every perception, as Taine has said, is a true hallucination; and conversely, every hallucination is a false perception. In some cases, it is probable, the hallucination may be described as an anomalous reaction to a sensory stimulus; a distorted or exaggerated perception. In other cases, as, for instance, in some hypnotic hallucinations, the process is apparently initiated in the brain itself. But in all cases the hallucination is a real perception. When a man sees a ghost, he is as much entitled to say he has *seen* it as when he sees a table; the difference, that the table is there and the ghost is not, is psychologically unimportant. In other words, the difference between perception and hallucination lies, not in the nature of the sensory stimulus, but in that of the perceiving organism. We need not here touch on the hallucinations which are conditioned by abnormal or morbid conditions in the organs or in the nerves proceeding from them, or those which are due to disease in the brain itself. Persistent apparitions are, of course, associated with many morbid conditions—delirium, visceral disease, mania. But the isolated hallucinations with which we are here chiefly concerned do not necessarily imply any greater deviation from normal health than the dreams which invade our nightly sleep. It is precisely in dreams that we find their nearest analogies; and the anomalous functioning of the perceptive centres which produces a hallucination is, according to some writers, rendered possible only by a slight 'dissociation' of the cerebral mechanism, such as we find more fully developed in sleep.

This theory, founded originally on the phenomena of disease and dreams, has received overwhelming confirmation in recent years through the study of hypnotism. It is one of the commonest and most effective of platform tricks—a trick which requires no previous education on the part of the subject—to suggest hallucinations. The hypnotised person will dandle a sofa-cushion in the full persuasion that it is a baby; will attempt to decipher the inscription on a moss-grown tombstone, which to the normal perception of the audience presents itself as a wooden chair; or will see sights and hear voices which have apparently no objective basis at all. In a more advanced subject hallucinations of all kinds can be induced after the termination of the trance; and many observers—Bernheim, Beaunis, Edmund Gurney, and others—have described experiments in which they made the subject, days or months after the order had been given, see human apparitions, veritable ghosts.

The old-time ghostseers, then, are so far justified. They did see something; it is only their interpretation which was at fault. But the man who claims to have seen a ghost claims in many cases, as we have said, to see it at the time of a death or disaster. The fact that we can now accept the first part of the ghostseer's story predisposes us favourably towards the other half. For it is difficult summarily to reject so much human testimony, seeing that its substantial accuracy, in part, has been already vindicated against the sceptics.

It was with the view of investigating these and kindred problems, such as the alleged marvels of spiritualism, that the Society for Psychical Research was founded in 1882. The society has from the outset worked by scientific methods, and has so far as possible allied itself with scientific investigations in kindred fields. Its members have included many well-known men of science, as well as men of distinction in other fields; Henry Sidgwick, Balfour Stewart, Sir W. Crookes, Sir Oliver Lodge, Sir W. F. Barrett, Professor W. James, and the Earl of Balfour have served as its presidents.

The first thing, obviously, was to ascertain the facts. For this purpose it was useless to rely on the records of the past. In a delicate investigation of this kind, data of the utmost attainable precision are requisite. And since the occurrence of sporadic hallucinations amongst persons in normal health is admitted, their supposed connection with a death or other crisis must, in the absence of precise data, be regarded as merely another instance of the well-known fallacy of counting the hits and ignoring the misses. At the instance, therefore, of the International Congress of Experimental Psychology of 1889, Professor H. Sidgwick, assisted by a committee of the society, undertook to institute an inquiry into the nature and distribution of sporadic hallucinations amongst the sane. The results are fully described in vol. x. of the society's *Proceedings*. 17,000 persons were questioned by the committee. In the event 655 out of 8372 men, and 1029 out of 8628 women, or 9·9 per cent. of the whole number, could recall having experienced a sensory hallucination at some time in their lives, many persons more than one. Of the whole number

of hallucinations described, about two-thirds affected the sense of sight; and of these visual hallucinations, realistic apparitions of the human figure formed about 75 per cent., as will be seen from the following table, which includes those cases only in which details of the apparition were given at first hand.

Nature of Apparition.	Within the preceding Year.	Within Ten Years.	More than Ten Years earlier.	Total (including those not dated).
Realistic human apparitions—				
Of living persons.....	35	157	166	352
Of dead persons.....	12	62	85	163
Unrecognised.....	17	126	140	315
Incompletely developed apparitions.....	13	60	74	143
Visions.....	1	8	10	21
Angels and religious visions.....	3	4	5	12
Grotesque, horrible, and monstrous.....	1	6	24	33
Of animals.....	3	12	7	25
Of inanimate objects ..	2	5	6	14
Of lights.....	—	12	4	17
Of indefinite objects...	—	8	8	17
Totals	87	460	529	1112

Out of the whole number of apparitions representing a living human being, viz. 381 (the number includes 29 hallucinations classed in the foregoing table under the heads of 'Incompletely developed' and 'Visions'), there were 65 cases reported in which the apparition had occurred within twelve hours of the death of the person represented, and before the fact of the death had become known by normal means by the percipient. Analysis of the figures showed, however, that they are defective in two opposite directions. On the one hand, as will be seen from the table, the figures for the most recent year are proportionately much larger than those for the whole decade; and the figures for the most recent decade nearly equalled those for the whole of the preceding period, which averaged about twenty years. It is clear that hallucinations which are regarded as having no special significance tend rapidly to be forgotten. On the other hand, those apparitions which seemed to coincide with a death were remembered too well; they grew proportionately more numerous—probably through exaggeration of the closeness of the time coincidence—as the accounts receded into the past. After making liberal allowance for both these and other sources of error, the committee came to the conclusion that about 1 recognised hallucination in 43 must be reckoned as having coincided with the death of the person represented. On the other hand, the proportion—if the coincidence was due to chance alone—would be 1 in 19,000.

If the allowances made by the committee for all sources of error incident to testimony in matters of this kind were sufficient, a causal connection between some of the hallucinations reported and the concomitant death was thus indicated. Such a connection is found in the theory of telepathy. Ever since its foundation in 1882 the chief investigators of the Society for Psychical Research have given much attention to the alleged possibility of communication between mind and mind or brain and brain without the intervention of the ordinary channels of sense. The classic experiments designed to test the possibility of such communication are those carried on in 1889-91 by Mrs Henry Sidgwick in conjunction with the late Professor Sidgwick and Miss Alice Johnson (*Proceedings S.P.R.*, vols. vi. and viii.). The results show a percentage of successes, in the transference of images of numbers, pictures, diagrams, imaginary scenes, &c., far beyond such as chance could afford. The precautions taken to guard against communication through the ordinary senses, even on the assumption of hyperæsthesia of hearing on the part of the percipient, seem to have been sufficient, and have never been effectively criticised. But obviously, so long as the two parties to the experiment are separated by no greater distance than a single room, or no more serious obstacle than a door or a wooden ceiling, the possibility of such communication can never seem completely excluded. And in any case the demonstration that one mind or brain could act upon another mind or brain at the distance of a few yards would not in itself justify the extension of such action to the phenomena of death apparitions, in which the presumed action must cover an interval of hundreds of miles.

Of late years, however, many successful experiments have been conducted in which the parties have been separated by much greater distances. Of these by far the most striking are the cross-correspondences, the records of which occupy the bulk of the society's *Proceedings* from 1906 onwards. In these experiments several ladies, some of them unknown to each other, have for some years practised automatic writing. The writings so produced, when carefully collated, are found to show traces of reciprocal influence in thought and expression such as seem beyond the possible scope of chance. Collusion would appear to be effectually excluded, it should be said, not merely by the character of the experimenters, but in many instances by the conditions of the experiments themselves and the nature of the results obtained. In these experiments we seem to find proof of an influence emanating from one mind or brain and affecting another mind or brain over a distance measured by thousands of miles—the distance sometimes between India or Boston (U.S.A.) and England. The results of these cross-correspondences, added to the evidence for a supernormal faculty of acquiring knowledge afforded by the trance communications of the American medium, Mrs Piper, which were carefully recorded and collated for several years, have put the hypothesis of telepathy on an almost unassailable basis. But it has not yet won general recognition, nor does it seem probable that it will be accepted until with the facts some explanation of the *modus operandi* can be suggested. A force whose operation is at one time affected by the interposition of obstacles at a distance of a few yards, and which at another time can cross from continent to continent, is like no force known to physical science. And until the matter has been further investigated, it seems that telepathy must be content to wait for full recognition by the scientific world. Meanwhile, as a working hypothesis, it will serve to explain many so-called occult phenomena, and, amongst others, apparitions occurring at the time of a death. The psycho-physiological explanation of the apparition as a hallucination must be regarded as proved. But in face of the high proportion of coincidences with death and other events demonstrated by the census, it is difficult to suppose that the hallucination is in all cases due to the normal preoccupation of the percipient with the image of the deceased. Such a view compels us in the first place to assume in all cases knowledge on the part of the percipient of the deceased's dangerous illness; and demonstrably in many cases such knowledge did not exist. And, again, even if knowledge of the illness had existed in all cases, the reported coincidences are still far too numerous for chance. Accepting telepathy, however, as a working hypothesis, we may assume that the hallucination in such a case is due to telepathic suggestion, just as post-hypnotic

hallucinations are due to verbal suggestion. In fact the recorded cases, when closely examined, are found to conform to such a theory.

The apparitions reported cluster thickly round the moment of death as the centre, occurring most frequently a few hours before, during the period of mortal illness, or a few hours later. No doubt the subconscious dramatic instinct would tend to improve the occasion by shortening the interval; but the evidence of other witnesses is in many cases sufficient to prove the substantial accuracy of the original narrative. It may be added that phantasms seen a few hours after death may still be regarded as due to an impulse received from a living brain, since, as shown by hypnotic experiments and by observations on crystal visions, &c., an impression received subconsciously may wait for hours or even days for a favourable opportunity before emerging into the upper consciousness.

Such an explanation of death wraiths, it need hardly be said, cannot yet be regarded as proved. A spring cannot rise above its source, and even the existence of telepathy is not yet incontrovertibly demonstrated. But it must, at the least, be regarded as provisionally holding the field. The theory derives some further corroboration from a number of cases in which apparitions are reported as coinciding with accidents or other crises. There are also instances recorded in which an apparition of a living person has been experimentally produced from a distance without verbal suggestion. These instances, however, are at present but few in number, and it is much to be desired that further experiments should be made in this direction.

If telepathy from the living may be regarded as furnishing an adequate explanation of apparitions at the time of death, it is held by some that by analogy telepathy from the dead is required to account for apparitions representing the dead. But in fact such apparitions, as shown by the census above referred to, are less than half as numerous as apparitions of the living. Moreover, they can in nearly all cases be explained as subjective hallucinations, conditioned by the preoccupation of the percipient's mind with the thought of the dead. In the rare cases when, for example, such an apparition is seen by a person ignorant of the death, we may still reasonably look, in the first instance, for the source of the apparition in the mind of the living. Such an explanation is again suggested by the phenomena of what are called 'haunted' houses. It would seem as if, in many cases, a nervous infection was communicated from one inmate to another. The facts, as so far investigated—the vague, shadowy character of the figures generally seen, the irreconcilable discrepancies in the descriptions of various observers, the purposeless nature of the manifestations—certainly lend little support to the theory of post-mortem influence.

The alleged occurrence of an apparition to two or more persons simultaneously is by some regarded as presenting insuperable difficulties to the hallucination theory, and as proving in some sense the objectivity of the apparition. But, in the first place, such collective apparitions may in many cases be explained as collective illusions—i.e. misinterpretations of real objects; and in the rarer cases where it is clear that the vision is of a subjective character, it is probably communicated, as a rule, from the original percipient to the others by verbal suggestion. This is no doubt the explanation of the collective visions occasionally seen by crowds of persons, as, for instance, in the year 1880 at Knock, in Ireland. But if these collective hallucinations occur unaided by verbal suggestion, which cannot be regarded as proved, they would still seem capable of explanation by telepathy.

Of the apparitions alleged to have been photographed by the camera, or to be seen and handled at spiritualist séances, it is not necessary to say much. The opportunities for fraudulent manipulation of the photographic plate are numerous. No evidence worth consideration has yet been adduced for the genuineness of any spirit photograph. The results are due in most instances to double exposure; and traces of the process may frequently be seen even by the non-expert.

The apparitions seen at dark séances when forcibly grasped have always turned out to be the medium or a confederate in disguise. In Sir W. Crookes's famous experiments of 1874, his confidence in the medium appears to have led him to take insufficient precautions against fraud. The experiments have never been repeated under satisfactory conditions. In the cases occasionally reported, where the materialised spirit is recognised in a good light as resembling a deceased person, we have occasionally grounds for supposing a hallucinatory transformation in the percipient's mind of the medium's features, a process of which other instances can be found.

See the articles on Animism, Demonology, Hallucination, Haunted Houses, Hypnotism, Psychology, Second Sight, Somnambulism, Spiritualism, Witchcraft. Amongst older works on the subject are Aubrey's *Miscellanies* (1696); Richard Baxter, *The Certainty of the World of Spirits* (1691); G. Sinclair, *Satan's Invisible World Discovered* (1685); Beaumont, *A Treatise of Spirits* (1705); Glanvill, *Sadducismus Triumphatus* (1681). Of more recent works, see Hennings, *Von Geistern und Geistersehern* (1780); Kerner, *Die Seherin von Prevorst* (1831); Brewster, *Natural Magic* (1832); Brierre de Boismont, *Des Hallucinations* (2d ed. 1852); Edmund Parish, *Die Sinnestäuschungen* (trans. as *Hallucinations and Illusions*, 1897); William James, *Principles of Psychology* (1891). See also Mrs Crowe, *The Night Side of Nature* (1853); Carus Sterne, *Naturgeschichte der Gespenster* (1863); W. Howitt, *History of the Supernatural* (1863); R. Dale Owen, *Footfalls on the Boundary of another World* (1875) and *The Debatable Land* (1874); Tylor, *Primitive Culture* (1871); Gurney and Myers, *Phantasms of the Living* (1886); A. Lang, *The Cock Lane Ghost* (1894); F. W. H. Myers, *Human Personality and its Survival of Bodily Death* (1903; abr. 1919); Frank Podmore, *Apparitions and Thought Transference* ('Cont. Sci. Series,' 1894; enl. ed. 1915), *The Naturalisation of the Supernatural* (1908), *The Newer Spiritualism* (1910); Sir W. F. Barrett, *Psychical Research* (1912); the publications of the Society for Psychical Research.

Appeal is the bringing before a higher court the judgment of a lower court which the appellant represents as erroneous in fact or law. Formerly this right was a guarantee against political oppression and private extortion; now the aim is to secure uniformity in the administration of justice, and is effected not merely by the reversal, on appeal, of erroneous judgments, but by the knowledge which every judge has of precedents in the Supreme Court, and that his own judgments are subject to appeal. The most important questions connected with the modern system of appeal are: (1) Whether in all cases, of whatever pecuniary value, appeal is allowed, and also whether at all stages, or only after final judgment; (2) On what conditions, as regards time, *interim* execution, and security for costs, appeal is allowed; (3) The relative constitution of the lower and higher courts.

In the civil law, the earliest form of appeal was the *provocatio* from the judgment of a criminal court to the Roman people. For some time the emperor was the only final court of appeal. In the Christian Church, under the judicial system defined in the False Decretals, frivolous appeals direct to the Roman Consistory multiplied enormously. The remonstrances of St Bernard were gradually given effect to by the Lateran and Basel Councils, and wholesome restrictions on the

right of appeal, and in favour of the independence of Cisalpine church courts, passed into most modern concordats. Even the indirect recognition of the judicial supremacy of the pope was in England made a statutory offence under the name of Præmunire.

In English law, prior to the Judicature Acts, 1873 and 1875, the word appeal was not commonly used. In common law courts, there was a proceeding in 'error' by 'assignment of error' and 'joinder of error.' In Chancery, the appeal was formerly called 're-hearing,' the Vice-chancellor being regarded as the delegate of the Lord Chancellor. Under the modern system of 'fusion,' every judgment in the High Court of Justice (except a judgment of the Court of Probate where leave is required) may by simple motion be submitted to the Court of Appeal, to have it reversed, discharged, or varied. Interlocutory proceedings in chambers may also be appealed to a judge in chambers; and from him appeal lies to the Divisional Court. In the Chancery Division, the judge has the discretion of directing the matter to be argued before him in court, or allowing appeal direct to the Court of Appeal. An appeal in Divorce requires in many cases to be to the 'full court,' not to the ordinary Court of Appeal. This last court consists practically of six Lords Justices of Appeal, sitting in two divisions—one for Common Law Appeal; the other for Chancery, Probate, Admiralty, and Bankruptcy Appeal. An appeal lies to the Judicial Committee of the Privy-council from an Indian or colonial court, but such appeal most frequently requires leave from the court below or the Judicial Committee, and, generally, security has to be given for costs. The law of appeal in Ireland is practically the same as in England.

As regards appeal from the inferior courts in England, an appeal lies from the county court to a divisional court of the High Court of Justice. All determinations in law by justices of the peace (including metropolitan police and stipendiary magistrates) may be brought up for the opinion of a divisional court of the High Court of Justice. As to appeals in ecclesiastical causes, the Privy-council is the Supreme Court of Appeal in all ecclesiastical causes which may originate in the diocesan and provincial courts; but the High Court of Justice, especially in the Chancery Division, may frequently, in questions of trust and property and contract, have to decide purely spiritual questions.

In 1907, after many previous attempts, there was constituted a Court of Criminal Appeal for England (7 Edw. VII. chap. 23). It consists of the Lord Chief-Justice and eight judges of the King's Bench Division. To this court any person convicted on indictment may appeal without leave on a question of law, and with leave on question of fact, or mixed fact and law. He may also with leave appeal against the sentence following on conviction, unless the sentence is one fixed by law. In general, where appeal is allowed, the sentence is quashed and an acquittal entered, but the court has large powers of substituting other convictions and sentences according to the facts and merits. The appellant is entitled to be present, and also to legal assistance, and the certified costs are treated as costs of prosecution. The act does not interfere with the prerogative of mercy, but the Secretary of State may refer a petition for mercy to the court. In cases of exceptional public importance an appeal from the court may be allowed to the House of Lords.

In Scotland, in the Court of Session the judgments of the Lords Ordinary sitting in the Outer House are appealed by a reclaiming note to the First or Second Division of the Inner House. These appeals are discouraged, except after final judgment by the Lord Ordinary, but they are competent at other stages, though in most cases only with leave of the judge. From all final judgments of the Inner House there is an appeal to the House of Lords within a period of one year. Where the judgment is not final, leave to appeal must be got, unless there has been a difference of opinion among the judges. Pending an appeal, the Court of Session has absolute power to regulate *interim* possession of property or execution of a decree for money.

The Court of Session has exclusive jurisdiction as a Court of Review in *civil* causes over all inferior courts, even in cases where its original jurisdiction is excluded, unless there be an express exclusion of review by statute; and where appeal is excluded, the Court of Session has jurisdiction to set aside their decisions, where they have acted in excess of their statutory jurisdiction. In the latter case, the technical remedy is generally by a note of suspension or an action of reduction. The normal appeal, however, from final judgment in the Sheriff Court is under the Sheriff Court Acts of 1907 and 1913, and lies directly to the Inner House. Cases are often brought up before judgment in the Sheriff Court for jury trial in the Supreme Court. The Court of Session, sitting as the Registration Appeal Court and the Valuation Appeal Court, hears appeals from the Registration Courts held by the sheriffs, from the valuation committees of the commissioners of supply, and from the magistrates in burghs; and there is also an appeal as to excise duties from the justices at quarter sessions.

Within the Sheriff Court itself, the right of appeal from the sheriff-substitute to the sheriff-principal is regulated by the Sheriff Court Act of the year 1907. Appeals from the Small Debt Court are confined to certain grounds mentioned in the Act 1 Vict. chap. 41 (such as malice and oppression and defect of jurisdiction in the judge), and are made to the next Circuit Court of Justiciary.

At common law, the High Court of Justiciary may review the proceedings of all inferior courts in criminal matters, but not on the merits. In cases tried without a jury the appellate jurisdiction of the High Court has been considerably extended and rendered more efficient by the Summary Jurisdiction Act of 1908. The proceedings of summary criminal courts may be brought before the High Court for review by (1) a bill of advocation, (2) a bill of suspension, (3) an appeal to circuit, and (4) an appeal by stated case. The last, now the ordinary mode, is competent on all questions of law, and is open equally to the prosecutor and the accused. As regards proceedings in a trial by sheriff and jury, the appellate jurisdiction of the High Court is more restricted. Neither the verdict of the jury nor the directions given by the sheriff to the jury can be submitted to review. No appeal lies from a sentence pronounced in the High Court.

In the United States, the distinction between an appeal, which originated in the civil law, and a writ of error, which is of common law origin, is that the former carries the whole case for review by the higher court, including both the facts and the law; while the latter removes only questions of law. An act of Congress of 1875 provides that the judgments and decrees of the circuit courts of the United States shall not be re-examined in the Supreme Court unless the matter in dispute shall exceed the sum or value of $5000, exclusive of costs. No judgment, decree, or order of a circuit or district court, in any civil action at law or in equity, shall be reviewed in the Supreme Court on writ of error or appeal unless the writ of error is brought, or the appeal is taken, within two years.

Appendicitis, inflammation of the vermiform appendix, a worm-like structure situated in the lower right side of the abdominal cavity and attached to the Cæcum (q.v., and see DIGESTION). The function of this appendix is unknown, but the organ is particularly subject to inflammation, and the inflammation becomes very dangerous when the peritoneal covering of the appendix is affected. Appendicitis may be associated with various organisms, and is set up by the presence in the appendix of small fæcal masses, of foreign bodies like seeds, or even by an external injury like a blow. The symptoms, generally speaking, are pain in the lower right region of the abdomen, digestive troubles (especially constipation), tenderness to touch beween the navel and the right iliac bone, and feverishness of moderate degree (about 102°). Milder cases are usually treated by palliative means, but severer forms, in which perforation of the appendix takes place, require immediate operation to prevent the development of general peritonitis. In all persons liable to recurring attacks, removal of the appendix between attacks is a sound procedure.

Appendicularia, a genus of Ascidians (q.v.), and type of a small but important order, the members of which retain the larval vertebrate characters which are lost in the more or less degenerate adult sea-squirts. Appendicularia is a minute free-swimming form with a long tail, and closely resembles an Ascidian larva. The brain and dorsal nerve-cord, the long notochord, the two respiratory slits opening directly from the pharynx to the exterior, and other vertebrate structures lost in the adult Ascidians are here retained throughout life, and demonstrate the true position of the class to which Appendicularia belongs.

Appendix Vermiformis. See APPENDICITIS, CÆCUM, DIGESTION.

Appenzell' (from *Abbatis Cella*), a double canton in the NE. of Switzerland. It is divided into two divisions—Innerroden and Ausserroden, the former of which is peopled by Roman Catholics, the latter by Protestants, and noted for its dense population. The surface is mountainous, especially in the south, where Mont Sentis attains an elevation of 8220 feet. The chief river is the Sittern, which flows through the centre of the canton. The inhabitants are chiefly employed in agriculture and cattle-keeping; in Ausserroden, however, cotton manufactures and embroidery are carried on. The dialect is peculiar, and the Appenzellers wear a characteristic costume. The canton, once dependent on the Abbey of St Gall, won its independence after a struggle, and joined the seven old cantons in 1452. Area, 163 sq. m.; pop. (1920) 69,968, of whom 55,354 are in Ausserroden.—APPENZELL, capital of the canton, is situated on the left bank of the Sittern, beneath the Sentis; pop. 5000 (Roman Catholics). It has old timbered houses, two convents, and a small trade in linen; and is 14 miles by rail SE. of Herisau (q.v.), the largest town in the canton.

Apperception, a word used by psychologists with some variety of meaning. For Leibnitz it meant something not very different from attention. Herbart and his followers employ it for the 'psychical activity by which individual perceptions, ideas, or ideational complexes are brought into relation to our previous intellectual and emotional life, associated with it, and thus raised to greater clearness, activity, and significance.' Thus in education each new experience is added to an existing 'apperception-mass.'

Apperley, CHARLES JAMES, an English sporting writer, born in Denbighshire in 1777. Educated at Rugby, he married early, and settled in Warwickshire, where he devoted himself to hunting. In 1821, under the name of 'Nimrod,' he began to contribute such attractive articles to the *Sporting Magazine* that its circulation was soon doubled. The proprietor paid him handsomely, and advanced him money, but his heirs afterwards brought an action against Apperley for its recovery. Nimrod prudently transferred himself to France, where he chiefly resided thenceforward. He died 19th May 1843. His best writings are *The Chase, the Turf, and the Road* (*Quarterly Review*, 1827), and the *Life of a Sportsman*, to the 1873 edition of which is prefixed a memoir of himself. *My Life and Times* was completed by E. D. Cuming (1927).

Appert, BENJAMIN NICOLAS MARIE, a French philanthropist, born in Paris, September 10, 1797, began about 1816 to introduce into several schools in the Nord department a system of mutual instruction, and in 1820 to teach the prisoners at Montaigu. Suspected of having aided the escape of two prisoners, he was himself in jail for three months. In 1825 he travelled through the whole of France, in order to discover means of elevating the criminal classes, and recorded the results of his investigations in a journal started for this purpose. From 1841 to 1844 he managed a colony for liberated prisoners and the children of prisoners at Némelfing, in the Moselle department; and afterwards he travelled in Belgium, Germany, and Austria, giving the results of his observations on the management of schools and prisons in several works, marked by great fairness and candour. He also wrote a work entitled *Dix Ans à la Cour du Roi Louis-Philippe*, and, in his *Conférences contre le Système Cellulaire*, strongly opposed the system of solitary confinement. He died about 1847.

Appetite (Lat. *appetitus*, from *appeto*, 'I desire') is generally used of the natural desire for food experienced in health. Its causes are two: (1) a condition of the *stomach*, not yet accurately understood, relieved by taking food; (2) a condition of the *system*, not relieved till the products of digestion begin to be absorbed into the blood.

Alteration of the appetite is perhaps the most common of all the symptoms of disease. Occasionally it is increased. *Morbid appetites* may consist in a desire which is, in character, natural and necessary to the animal economy, but becomes unhealthy when excessive and irresistible. Of this, the hunger which attends marasmus, and the thirst which attends diabetes, may be cited as illustrations. They may consist, further, in a craving for articles or objects which are not in reality deleterious or detrimental, but which do not constitute the ordinary gratification of the appetite, such as the desire for chalk and lime experienced by chlorotic and hysterical women. They may, thirdly, consist in the longings, often complicated with delusions, felt by pregnant women and others, which are injurious, repugnant to nature, and revolting. Georget gives an instance where a wife coveted the shoulder of her husband, killed him in order to obtain the morsel, and salted the body in order to prolong the hideous cannibalism. In such a case the gross longing may be said to constitute the disease; but there are others in which it is one of many symptoms demonstrating the degradation of the mind under general disease, as when the insane devour garbage and excrement, or swallow grass, hair, stones.

Much more frequently the appetite is diminished, and accordingly medicines which increase the appetite and improve the digestion are often necessary. The chief of these *stomachic tonics* are vegetable bitters, as calumba and gentian; dilute mineral acids; meat extracts; pepsin and other digestive agents prepared from the organs of the lower animals. See DIET, DIGESTION, INDIGESTION, FOOD; cf. also THIRST.

Appian (Lat. *Appianus*), a native of Alexandria, who flourished during the reigns of Trajan, Hadrian, and Antoninus Pius. He was author of a Roman history in twenty-four books, of which only eleven are extant. It was remarkable principally for the plan on which it was written. Instead of proceeding to exhibit chronologically the growth of the empire, its author divided his work into ethnographic sections, recording separately the history of each nation up to the time of its conquest by the Romans. First in order were the books devoted to the old Italian tribes, and afterwards followed the history of Sicily, Spain, Hannibal's wars, Libya, Carthage and Numidia, Macedonia, Greece proper and its colonies, Syria, Parthia, the Mithridatic war, the civil wars, and the imperial wars in Illyria and Arabia. As a historian, Appian is a mere compiler, and not very accurate in his compilation. His geographical knowledge, in particular, is singularly deficient, considering the age in which he lived. One specimen of his blunders will suffice; in his section on Spain, he states that it takes only half a day to sail from Spain to Britain. The standard editions are those by Bekker (1852–53) and Mendelssohn (1879–1905); White's (1912) gives an English translation.

Appia'ni, Andrea, styled in his day 'the Painter of the Graces,' was born at Milan, May 23, 1754. His style was formed from a close study of the works of Raphael and other masters of fresco-painting, and his first works were a series of frescoes in Milan. His best works are the frescoes of the myth of Eros and Psyche in the royal villa at Monza, the cupola-paintings in the church of *Santa Maria di S. Celso* at Milan, and Apollo with the Muses in the Villa Bonaparte. Napoleon I. patronised him, but after his fall Appiani fell into great poverty. He died at Milan, November 8, 1817.

Appian Way (Lat. *Via Appia*), well named by an ancient writer *Regina Viarum* ('the queen of roads'), was formed, in part at least, by Appius Claudius Cæcus, while he was censor (313 B.C.). It is the oldest and most celebrated of all the Roman roads, and with its branches connected Rome with all parts of Southern Italy. It had an admirable substructure or foundation, from which all the loose soil had been carefully removed. Above this were various strata cemented with lime; and lastly came the pavement, consisting of large hard hexagonal blocks of stone, composed principally of basaltic lava, and jointed together with great nicety, so as to appear one smooth mass. The cost must have been enormous, for the natural obstructions are great. Excavations instituted by the papal government in 1850–53 reopened the road as far as Albano. The railway from Rome to Naples travels east of this restored portion (now called the *Via Appia Nova*), while a direct line passes under the old road six miles from Rome.

Appin (*Apthane,* 'abbey lands'), a beautiful coast district of Argyllshire, extending along the east shore of Lóch Linnhe, 15 miles NNE. of Oban. It is the country of a branch of the Stewarts, whom Hogg has celebrated in verse, and a history of whom was published at Edinburgh in 1880.

Appius Claudius. See Claudius (Appius).

Apple (*Pyrus Malus.* For the generic character, see Pyrus). This well-known fruit has been very long cultivated, and by that means it has been very much improved. It was extensively cultivated by the Romans, by whom, probably, it was introduced into Britain. The wild apple, or Crab-tree, a native of Britain, and very generally found in temperate climates of the northern hemisphere, is a rather small and often somewhat stunted-looking tree, with austere, uneatable fruit; yet it is the parent of all, or almost all the varieties of apple so much prized for the dessert. The apple-tree, even in a cultivated state, is seldom more than 30–40 feet high. It has a large round head; the leaves are broadly ovate, much longer than the petioles, woolly beneath, acute, crenate, and provided with glands; its flowers are always produced in sessile umbels, and are various in size, according to the variety. Some are almost as white as pear-bloom, but the great majority are either striped or tinged with rosy tints outside, and some are of bright carmine. All have a delicate

Branch of Apple with young Fruit:
a, piece of the blossom.

fragrance, much more refined than that of pear-bloom. The fruit is roundish, or narrowest towards the apex, with a depression at each end, generally green, but also frequently yellow, light red, dark red, streaked, sometimes even almost black, with the rind sometimes downy, sometimes glabrous, sometimes thickish, and sometimes very thin and transparent, varying in size from that of a walnut to that of a small child's head—the taste more or less aromatic, sweet, or subacid. It is produced on spurs which spring from branchlets of two or more years' growth, and continue to bear for a series of years. The fruit of the apple is, with regard to its structure, styled by botanists a *pome.* The eatable part is what is botanically termed the *mesocarp* (see Fruit), which, in its first development, enlarges with the calyx, the summit of the fruit being crowned in general by the dried quinquefid sepals; the *endocarp* being, when ripe, cartilaginous, and containing in its cells seeds which do not correspond with them in size, but are so free as sometimes to rattle when it is shaken. Dr Hogg has introduced a more scientific classification of varieties, according to the structure of the stamens, the tube, the carpels, and the sepals.

The apple is now one of the most widely diffused of fruit-trees, and for the general fruit-supply of Britain is the most valuable of all. It succeeds best in the colder parts of the temperate zone. It is, however, to be met with on the coasts of the Mediterranean Sea, in Arabia, Persia, the West Indies, &c., but there its fruit is as small and worthless as in high northern latitudes. The varieties in cultivation are by far too numerous. They have been classified with great care by German, French, English, and American writers, by whom the classification and description of apples, pears, and similar fruits has been made quite a matter of science, and entitled Pomology. Metzger, in his description of the pomaceous fruits of Southern Germany, describes 89 different kinds of apple, all of which are constant, besides sub-varieties. There are now at least 2000 varieties

cultivated in Great Britain, and perhaps twice that number, for many provincial sorts have as yet escaped the pomologist. New varieties are continually produced from seed; and as the apple is chiefly propagated by grafting—although some few can also be raised by means of layers and cuttings—the older varieties are superseded in many cases by newer ones. But some of the best kinds still in use can be traced back for centuries. The *costard*, from which dealers in apples received the name of costardmongers, still exists, though not largely grown, perhaps on account of the ribbed formation, from which it is believed to take its name, *pomum costatum*. Certain family divisions have been made, popular rather than correct, of apples (as of pears and plums)—e.g. Pippins, Codlins, Russets, Rennets, Pearmains, Calvilles, Crabs, &c. Some kinds, not approved for the dessert, are in high esteem as baking-apples, and others still more acid or austere are preferred for the manufacture of Cider (q.v.).

The apple is grown in Britain either as a standard, an espalier, or a wall-tree, and is variously trained. It was generally grafted on apple or crab stocks, but now a dwarf variety, either the *Paradise* or *Doucin* stock, is largely used to restrict the growth and hasten the time of bearing; and trees thus dwarfed are often very productive when little larger than currant or gooseberry bushes. Some of the varieties of apple are more hardy than others, and are therefore to be preferred for cold or exposed situations. Some of the finest kinds succeed well only when the soil and climate are good. Some kinds are much earlier than others in flowering, some in ripening. It is a mistake to suppose that an early bloomer is therefore an early ripener. The converse is frequently the case with all *fruit-trees*.

The wood of the apple-tree is hard, durable, and fine-grained. The crab is often planted both as an ornamental tree and for the sake of its wood. The bark contains a yellow dye.—As a fruit-tree, the apple requires a fertile soil and sheltered situation. The various uses of the fruit—for the dessert, for baking, preserving, making jelly, &c., as well as for making the fermented liquor called cider—are sufficiently well known. Vinegar is also made from it; and sometimes a kind of spirit, especially in Switzerland and Swabia. It contains *Malic Acid*, which is extracted for medicinal purposes.—The fermented juice of the crab apple is called *Verjuice*. It is used in cookery, and sometimes medicinally; also for the purifying of wax. The apple *keeps* better than most kinds of fruit. *Beaufins* or *Biffins* are apples slowly dried in bakers' ovens, and occasionally pressed till they become soft and flat.—The CHINESE CRAB (*P. spectabilis*) is very ornamental when in flower.

In the beginning of the 20th century coreless and seedless apples were, after long experiment, produced in Colorado. For blossom there is only a stamen, a little pollen, and a cluster of tiny green leaves round the forming apple. Hence the tree is immune from the effects of frost and the ravages of the codling moth.

Vast quantities are imported into Britain from France, Canada, the northern United States, and latterly from Tasmania and Western Australia (the latter ripened in our winter). Not till 1845 was apple-growing begun in the neighbourhood of Oregon; but since 1900 the states of Oregon and Washington, together with British Columbia, have become the great apple orchard of the world, producing apples of the very finest quality. Land in Washington which before planting in 1900 was bought for £20 an acre was, with apple-trees and irrigation ditches, valued at £400 or more. Few apples were exported from the north-west of the United States till 1900. British Columbia was some eight or ten years later than Oregon and Washington in fully establishing its claims to rank beside them; see COLUMBIA (BRITISH).

The apple figures largely in Greek and Scandinavian mythology. Abela in Campania may take its name from the apple, for which it was famous (*Æneid*, vii. 740); and Apollo, according to some, is from the same root (*p* for *b* may point to an Illyrian source). See also ATALANTA, HESPERIDES, PARIS. The traditional 'apple' of Eden (see ADAM AND EVE) need not be identified with our apple (Tristram made it an apricot).

See FRUIT, GARDENING, ORCHARD, PLANTS (DISEASES OF), AMERICAN BLIGHT, and for the Crabs, CRAB-APPLE; De Candolle's *Origin of Cultivated Plants* (1872); and the special manuals such as Thomas's *Book of the Apple* (1902), Bailey's *Apple Culture* (1905), Bealby's *Fruit Ranching in British Columbia* (1909).

Appleby, the county town of Westmoreland, on the Eden, 13 miles SE. of Penrith. There is a castle, first mentioned in 1088, the keep of which, called Cæsar's Tower, is still in tolerable condition. Appleby was disfranchised by the Reform Bill of 1832, but it received a new municipal charter in 1885. Its trade depends on the agricultural district around, and it is a holiday-resort. Pop. 1800.

Apple of Sodom. See SOLANUM.

Appleton, a city of Wisconsin, U.S., 185 miles N. of Chicago, and 120 miles from Milwaukee by rail. It is noteworthy chiefly from its situation on the Grand Chute Rapids of the Fox River, which, with a descent of 30 feet in 1½ mile, affords immense water-power for flour, paper, and woollen mills. There are also manufactures of machinery. The city is the seat of Lawrence College (interdenominational). Pop. 20,000.

Appleton, CHARLES EDWARD, D.C.L., was born at Reading, 16th March 1841, and was educated at Oxford and in Germany. His reading was wide and varied, but he wrote little. He took a lively interest in the movement for the 'endowment of research,' and he founded in 1869 the *Academy*, its special feature being its signed articles. He died at Luxor, in Upper Egypt, in 1879. See his *Life and Literary Relics*, by J. H. Appleton and A. H. Sayce (1881).

Appleton, DANIEL (1785–1849), the founder of the American publishing house of D. Appleton & Co., was born at Haverhill, Mass., where he commenced business as a retail trader. Removing to Boston, he afterwards settled as a bookseller in New York, and gradually built up one of the largest businesses of its kind in the United States. He retired in 1848 in favour of his three sons, of whom the last died in 1878. The success of the firm justified it in beginning, previous to 1857, the *New American Cyclopœdia*, under the editorship of George Ripley and Charles A. Dana, which was completed in 1863, in sixteen volumes, at a cost of £100,000. A new edition was published in 1872–76. The same firm has issued many scientific and educational works.

Appogiatu'ra ('leaning note'), an Italian musical term, designating a form of embellishment by insertion of notes of passage in a melody. The appogiatura notes are printed in a smaller character than the leading notes of the melody, and should always be given with considerable expression. There are two species, the long and the short. The former is now seldom printed, the music being written as played; the latter is usually termed an *Acciaccatura*, and written with a short stroke across the stem of the note. The appogiatura proper takes half its length from the note it precedes, except when preceding a dotted note, from which it takes a third. The following is an example:

Appointment. In a deed or will, power is often given or reserved to a certain person to appoint the uses to which property may be applied. Thus, a marriage settlement may contain a power of appointment, enabling the wife to distribute her property among the children of the marriage at her own discretion. The appointment when it is made derives its force, and the party in whose favour it is made derives his title, from the instrument in which the power of appointment is contained. The Courts of Equity give relief against a defective appointment, or defective execution of a power, where there is what is called a 'meritorious consideration' in the person applying for such relief. As to what amounts to such meritorious consideration, Lord St Leonards, in his work on Powers, lays down that equity will relieve the following parties: (1) A purchaser, including in such term a mortgagee and lessee; (2) A creditor; (3) A wife; (4) A legitimate child; and (5) A charity. But in the case of a defective appointment by a wife in favour of her husband, there is no relief in equity; nor is the equity extended to a natural child; nor to a grandchild; nor to a father or mother, or brother or sister, even of the whole blood, much less of the half-blood; nor to a nephew or cousin. Against the legal consequences of an appointment, the Courts of Equity give no aid. See POWER.

In the Scots law, the expressions *reserved power*, *faculty to burden*, and *faculty of distribution*, correspond to the English phrase 'power of appointment;' and the deed or instrument subsequently executed in virtue of the reserved power, is simply described according to the nature and quality of the conveyance so made; but the term *appointment* is not a technical word in Scotland.

Appomattox Courthouse, a village of Virginia, 20 miles E. of Lynchburg. Here General Lee, on April 9, 1865, surrendered the army of Northern Virginia, 27,805 men strong, to General Grant.

Apportionment may be stated to be this—that in the event of the termination of a life-interest by death, or of a more limited interest at a fixed period, the current rent or income shall be apportioned or paid over in such a way as to give the personal representatives of the party, or the party himself, as the case may be, a sum corresponding to the period that may have elapsed between the last date of payment and the death or other determination of the interest or estate. This was the effect of the Apportionment Act, 1834, which applied to the whole United Kingdom. It dealt chiefly with the cases of heirs of entail, liferenters, &c. The Apportionment Act of 1870 extends the principle to all rents, annuities, salaries, pensions, dividends, and other periodical payments, in the nature of income, so that all these now, like interest on money lent, are considered as accruing from day to day and are apportionable. When a person, therefore, dies, the income accruing up to the day of death is payable at the next term of payment to the executor of the deceased. In the case of rents, however, he must recover the proportion, not from the tenant liable for the whole payment, but from the heir (i.e. the new landlord) who receives it. Annual sums payable under policies of insurance are not apportionable by virtue of the statute.

The word apportion is also used technically in English law to indicate (1) that a contract is divisible, so that a party may sue on one obligation, although he may not have performed all his obligations; (2) that a common of pasture may be divided proportionally among the owners of the common to which the pasture is attached.

Apposition, a term in Grammar signifying the annexing of one substantive to another, in the same case or relation, in order to explain or limit the first; as, *My brother, the physician; Thomas the Rhymer.* Whole sentences or clauses admit of apposition; thus, 'Napoleon sought the way to India through Russia—a stroke of genius.' Sometimes a connecting word is used where logical propriety would require apposition; as, *the city of Bristol*, for *the city Bristol.*

Appraisement. An appraisement signifies generally any valuation of property; but in England the term is also used technically to denote a valuation by two sworn appraisers under a distress for rent. Where the value of the appraisement does not exceed £5, a stamp of threepence is required, and if over £500, the duty is £1; between these amounts *ad valorem* stamp-duties from sixpence to fifteen shillings are exigible. Appraisements are exempted from duty if they are made (1) For the information of one party only; (2) In pursuance of the order of any Admiralty Court, or Court of Appeal therefrom; (3) For the purpose of ascertaining legacy, succession, or inventory duties; (4) With reference to the property of a bankrupt; (5) For Income-tax purposes.

An appraiser is a person licensed to make appraisements or valuations. The cost of the annual license is £2, but licensed auctioneers and attorneys require no special license. The appraiser is bound to write out the appraisement on duly stamped paper under a penalty of £50, and any person receiving or paying for an unstamped appraisement is liable to forfeit £20.

Apprehend. See ARREST.

Apprentice is a person described in law-books as a species of servant, and called apprentice, from the French verb *apprendre*, 'to learn,' because he is bound by indenture to serve a master for a certain term, receiving in return for his services instruction in his master's profession, art, or trade; the master, upon the other hand, contracting to instruct the apprentice, and, according to the nature of the agreement, to provide food and clothing for the apprentice, and to pay him small wages. The system of apprentices was incidental to the old craft guilds. Only apprentices were admitted to the freedom of the craft, and thus not only was monopoly secured, but a valuable organisation of the trade. In England the system was widespread and important, both in the early history of trade and from its later connection with the English poor-law system, under which apprenticeship gave a right of settlement. In Scotland the system never had the same importance, and now, except in one branch of the legal profession, apprenticeship is voluntary. By a provision of the 5 Eliz. chap. 4, it was in general required that every person exercising a trade in England should have previously served as apprentice to it for seven years; but by later statutes, that provision was abolished, with a saving of the customs and by-laws in London and other corporations; and the term of apprenticeship is now determined by the mutual convenience of the contracting parties. By the Municipal Corporation Act, 1834, all such customs and by-laws as had the effect of prohibiting trades and occupations to persons who had not served as apprentices were also abolished. But in many trades the modern unions still practically enforce a law restricting the

number of apprentices, &c., and prohibiting the employment of those who have not served as apprentices. Apprentices, in general, are bound out by their friends, though with their own consent, testified by their executing the indentures, without which the transaction is not binding. The rule of the Scots law is that, where the apprentice is a pupil, his father or tutor signs the indenture. An apprentice, on the other hand, who has passed the years of pupilarity may effectually enter into an indenture by which he will be personally bound. But the minor's father, if alive, or his curator, if he has a curator, should consent and concur in the indenture. It has been decided in England that the express assent of an infant apprentice to the indentures is essential to the contract. As a rule writing is essential, and a cautioner or surety is generally required. Under the Stamp Acts the indenture is void if the full consideration is not set forth.

The apprentice is bound to enter the service and continue in it; and even after enlistment in the army, the apprentice, if under the age of twenty-one, may be reclaimed by the master by a proceeding before a justice of the peace. The master has also an action against any one who entices away an apprentice. The apprentice must be obedient, diligent, respectful towards his master, and must behave decently and honestly; but the misconduct must be gross to justify dismissal. The master, on the other hand, must teach the apprentice his whole art and mystery. He must treat him properly, and provide him with medical attendance and medicine in sickness. He cannot assign the apprentice to another. The term 'workman' in the Workmen's Compensation Act, 1906, includes an apprentice. See COMPENSATION, MASTER AND SERVANT.

There is a special class of apprentices in England who are bound out by the guardians of the poor, and are called *parish apprentices*. Formerly the children of poor persons might, even without becoming parties to the indentures, be apprenticed out by the overseers with the consent of two justices (now by the guardians, without such consent), till twenty-one years of age, to suitable persons; and such persons might till 1844 be compelled to take them. But the reception of any poor child as an apprentice is no longer compulsory. A variety of statutes regulate the manner in which parish apprentices are to be bound, assigned, registered, and maintained. This is under the control of the Ministry of Health, who make new rules from time to time, as they may think fit; and the justices of the peace are empowered to settle disputes between such apprentices and their masters, and to discharge the former from their indentures, upon reasonable cause shown. See FACTORY ACTS.

An apprentice's indenture is terminable by the consent of all the parties to it; and also by the death of the master, or of a partner of the employing firm. In such cases a portion of the fee is generally returnable. On the death of the apprentice, however, the fee is not returnable. But the executor of the master may bind the apprentice to another master if the contract so provide; and he must also discharge any covenant or agreement for the apprentice's maintenance, so far as he has assets. By the custom of London, if the master of an apprentice die, the service must be continued with the widow, if she continue to carry on the trade. In other cases, it is incumbent on the executor to put the apprentice to another master of the same trade. The bankruptcy of the master operates as a discharge of the indenture of the apprentice, who, if he has paid an apprentice fee to the bankrupt, is entitled to be paid by the court a reasonable sum out of the estate. Apprentices not paying premium, and whose premium was less than £25, are in general subject to the provisions of the Employers' and Workmen's Act, 1875—i.e. a court of summary jurisdiction may order the apprentice to perform his duties, and in default imprison him; may cancel the indenture and order repayment of premium; and may award damages up to £10 against either party or the cautioner.

By the Army Act, apprentices enlisting in the army, and concealing their apprenticeship when brought before a magistrate to be attested, may be indicted for obtaining money under *false pretences;* and if, after the expiration of their apprenticeship, they do not surrender to a recruiting officer, they may be apprehended as deserters.

Apprentices to the sea service are governed by the provisions of the Merchant Shipping Acts. Superintendents of mercantile marine shall give to boards of guardians, overseers, and others, all assistance in their power for facilitating the apprenticing of boys under their charge to the sea service. In the case of boys bound by guardians of the poor, the indentures must be executed in presence of two justices, who shall see that the boy has attained 12 years of age, has consented to be bound, that he is of sufficient health and strength, and that the master is a proper person for the purpose. See MASTER AND SERVANT; Reginald Bray's *Boy Labour and Apprenticeship* (1911); Dunlop and Denman, *English Apprenticeship and Child Labour* (1912).

The practice of trade-unions above referred to lowered the standard of skilled labour in many trades, and the National Institution of Apprenticeship, London (with some help from the Charity Commissioners), is endeavouring to improve matters.

In the United States the system of apprenticeship has largely become obsolete; little account is taken of indentures and the serving of time.

Approbate and **Reprobate,** a technical expression in the law of Scotland, which means that no one can be permitted to accept and reject (*approbare* and *reprobare*) the same deed or instrument. The most frequent occasion for the application of the doctrine arises where the will of a testator confers benefits on his wife and children and at the same time directs a distribution of his estate, which, expressly or by clear implication, is inconsistent with his wife or children taking their indefeasible 'legal rights' under the Scots law of succession. In these circumstances they must choose whether they will accept the benefits conferred on them by the will or stand by their 'legal rights.' They cannot 'approbate' the will by accepting the benefits and 'reprobate' it by claiming their legal rights, and so *pro tanto* frustrating the distribution of the estate directed in the will. They are, in fact, put to an 'election.' The doctrine is, it is now settled, identical with that of election in English law. Where, however, the will does not indicate a clear intention that the taking of their legal rights by the wife or children shall involve a total forfeiture of the testamentary benefits, there comes into operation the principle of 'equitable compensation.' Under this principle, the wife or children who have elected to take their legal rights are excluded from the testamentary provisions in their favour only to the extent necessary to compensate the other beneficiaries whose interests have been prejudiced by that election.

Appropriation is the opposite of expropriation, and means making something the property of a particular person—e.g. game, which is the property of no one, is appropriated by capture; or one man is said to appropriate the ideas of another. The word has various important applications in law. (1) Where so much iron or oil, for

instance, has been sold, but the quantity is not separated by weight or measurement from a larger mass; or where a certain proportion is sold, but the exact quantity or price is not known until measurement, &c.; in such cases the risk of the goods perishing and the ownership do not pass to the buyer. Before delivery, however, the goods may be 'appropriated' to the contract so as to produce this effect. (2) When a bill is drawn against goods, and the bill of lading is sent as a security to the acceptor, the goods are said to be appropriated to the payment of the bill. (3) Where several debts are due to the same creditor, the debtor, in making a payment, may appropriate it to a particular debt. If he does not do so, the creditor may apply it as he pleases—e.g. to the least secured debt, or to interest instead of principal. Where the parties say nothing, the law appropriates the payments in order of date. Thus, in a banking account, the first item on the credit side is applied to the first item on the debit side, and so on. In church law, an appropriator is the owner of a benefice—e.g. the lay rector who receives the tithes, but is bound to appoint a vicar or perpetual curate for the spiritual service of the parish. In constitutional law, appropriation means the principle that 'supplies granted by parliament are only to be expended for particular objects specified by itself.' This principle was acted on by the Commons during the Commonwealth, was definitely established during the Dutch war of 1665, and since the reign of William III. has been expressed in the Annual Appropriation Act by a clause prohibiting the treasury officials from applying public money to any service other than that to which it has been specially appropriated. The appropriation of a benefice meant the transference of its tithes and endowments to a religious house or other corporation.

Appropriation Act is an act, passed at the end of each session of parliament, summing up and ratifying all the resolutions as to expenditure adopted by the House of Commons during the session. The bill, which is brought in by the Committee of Ways and Means, authorises the Treasury to issue out of the Consolidated Fund the balance of money required for expenditure in addition to the votes on account, gives authority to borrow either on Treasury bills payable during the financial year or otherwise for short periods, and 'appropriates' the money granted by the bill itself as well as by the votes on account. Upon the second reading of the bill in the House of Commons, it is customary to have a general debate on any subject in relation to which money is granted. The bill is formally agreed to by the House of Lords.

Approver, or PROVER, in the law of England, is a person who has been an accomplice in the perpetration of a crime, but who is admitted to give evidence against the prisoner. Formerly it was applied to one guilty of treason or felony who confessed on the promise of a pardon, conditional on the conviction of those whom he implicated.

The modern practice is to admit accomplices to give evidence for the prosecution, or, as it is said, to turn *King's evidence*, upon an implied promise of pardon, on condition of their making a full and fair confession of the whole truth. This assurance is generally given by the committing magistrate. The admission, however, of an accomplice to give evidence against his fellows at the trial requires the sanction of the judge presiding at the trial, and such sanction is not given unless the evidence appears to be necessary to secure a conviction and likely to be corroborated. The testimony of an accomplice is in all cases, however, regarded with just suspicion; and unless his statement is corroborated in some material part by unimpeachable evidence, the jury are usually advised by the judge to acquit the prisoner; and if the accomplice, after having confessed the crime, and being admitted as King's evidence, does not satisfy the condition on which he was so received by failing to give full information without equivocation, reservation, or fraud, he then forfeits all claim to protection, and may be tried, convicted, and punished on his own confession. The practice, however, is to direct an acquittal before the accomplice is examined, if he has been joined in the indictment.

The term in the law of Scotland analogous to that of approver is *socius criminis*, and the principles on which the socius is admitted, and on which his evidence is left to the jury, are the same as in England. But the criminal courts in Scotland give absolute protection to the socius who has been examined, after proper warning from the judge that what he says cannot be used against him. This privilege is altogether independent of the prevarication or unwillingness with which the witness may give his testimony. Justice, indeed, may often be defeated by a witness retracting his previous disclosures, or refusing to make any confession after he is put into the box; but it would be much more put in hazard if the witness was sensible that his future safety depended upon the extent to which he spoke out against his associate at the bar. The only remedy, therefore, in such a case is committal of the witness for contempt or prevarication, or indicting him for perjury, if there are sufficient grounds for any of these proceedings.

Approximation, a term commonly used in mathematical science to designate such calculations as are not rigorously correct, but approach the truth near enough for a given purpose. Thus in logarithmic and trigonometrical tables nearly all the numbers are mere approximations to the truth. The calculations of astronomy generally are of this nature. Even in pure mathematics there are parts in which approaches to the truth, by means of interminable series, are all we are able to gain. The solution of equations beyond the fourth degree can be got only by approximation.

Appuleius. See APULEIUS.

Appulia. See APULIA.

Appun, KARL FERDINAND (1820–72), naturalist, born at Bunzlau, travelled for many years in Venezuela, British Guiana, and Brazil. He wrote *Unter den Tropen* (1871).

Apraxin, FEODOR, COUNT, creator of the Russian navy and court favourite, was born in 1671. Entering the navy, he rapidly rose to be admiral. In 1708 he defeated the Swedes; in 1710 he captured Viborg, in Finland; and in 1711 commanded in the Black Sea during the Turkish war. Again, in 1713, he conducted the war with Sweden so successfully that Russia was confirmed in her possession of Finland, just conquered, and of Esthonia. In 1714, however, and again in 1718, he was charged with responsibility in connection with embezzlement, tried, and condemned to pay a fine; but in spite of this and his opposition to many of Peter's reforms, his services were too useful to be dispensed with. In 1722 he accompanied Peter in his Persian war. He died in 1728.

Apricot (*Prunus armeniaca*), a species of the same genus with the Plum (q.v.), is a native of Caucasia, and is cultivated throughout Asia, Europe, and America. It is a small tree of from 15 to 30 feet high, with ovate, acuminate, and cordate, smooth, doubly-toothed leaves on long stalks; solitary, sessile, white flowers which appear before the leaves, and fruit resembling the peach, roundish, downy, yellow, and ruddy on the side next the sun,

with yellow flesh. The apricot was brought into Europe in the time of Alexander the Great, and since the days of the Romans has been diffused over all its western countries. It has been cultivated in England since the middle of the 16th

Apricot (*Prunus armeniaca*).

century. It is only in the south of England that it is ever trained as a standard, nor is it grown in the more northern parts even as an espalier, but almost always as a wall-tree. More than twenty kinds are distinguished, amongst which some excel very much in size, fine colour, sweetness, and abundance of juice. The finest varieties in Britain are the *Moor Park*, *Royal*, *Frogmore Early*, *Large Early*, *Turkey*, and *Powell's Late*, which all ripen between mid-August and mid-September, and which are generally budded on plum or wild cherry stocks. The fruit keeps only for a very short time, and is either eaten fresh, or made into a preserve or jelly. Apricots split up, having the stone taken out, and dried, are largely exported from Italy (Trieste, Genoa, Leghorn) and from the south of France, and also after being preserved and candied. They are also imported through Afghanistan into northern India. Dried apricots from Bokhara are sold in the towns of Russia, the kernels of which are perfectly sweet, like those of the sweet almond. The kernels are sweet in some kinds, and bitter in others—the bitterness being probably more natural, and the sweetness, as in the almond, the result of cultivation. Generally speaking, they may be used for the same purposes as almonds. From the bitter kernels, which contain Prussic acid, the *Eau de noyau* is distilled in France. The charred stones yield a black pigment similar to Indian ink. The wood of the tree is good only for the purposes of the turner.

The Briançon Apricot (*P. brigantiaca*) very much resembles the common apricot. The fruit is glabrous. It is found in Dauphiné and Piedmont. At Briançon, an oil, called *Huile de marmotte*, is expressed from the seeds. The Siberian Apricot (*P. sibirica*) is also very like the common apricot, but smaller in all its parts. The fruit is small. It is a native of Siberia, especially of the southern slopes of the mountains of Dahuria. The Apricot Plum is, as the name implies, not an apricot. It is an excellent kind of plum, which, in some parts of France, is preserved in sugar, dried, and extensively exported.

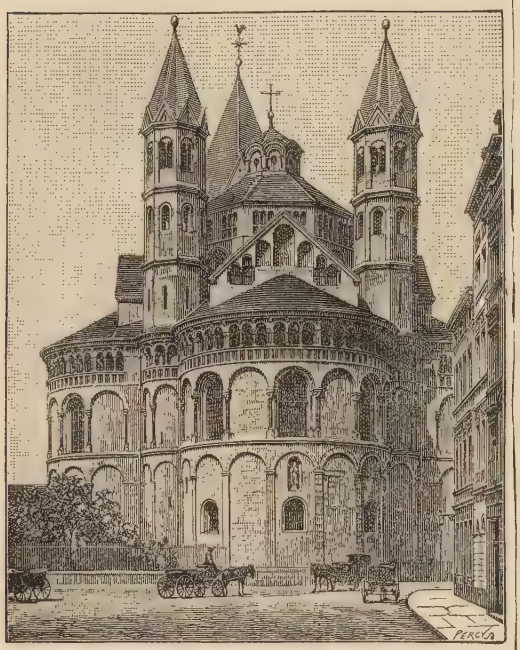
The older form of the name, *apricock*, best shows the descent of the word through Portuguese *albricoque*, Arab. *al* (the) *barqúq*, and late Gr. *praikokion*, from Lat. *præcoqua*, *præcox*, 'early ripe.'

April. The Romans gave this month the name of *Aprilis*, derived from *aperire*, 'to open,' probably because it is the season when the buds begin to open; by the Anglo-Saxons it was called Eastermonth. The custom of sending one upon a bootless errand on the first day of this month, has been supposed to be a travesty of the sending hither and thither of the Saviour from Annas to Caiaphas, and from Pilate to Herod, because during the middle ages this scene in Christ's life was made the subject of a miracle-play at Easter, which usually occurs in April. It is more probable that it is a relic of some old heathen Celtic festival. The custom, whatever be its origin, of playing off little tricks on this day, whereby ridicule may be fixed upon unguarded individuals, appears to be universal throughout Europe. It is believed that both England and Germany derived the custom from France. In France, one thus imposed upon is called *un poisson d'avril* (an April fish). In England such a person is called an April fool; in Scotland, a gowk. Gowk is the Scots for the cuckoo, and also signifies a foolish person. The favourite jest in Britain is to send one upon an errand for something grossly nonsensical; or to make appointments which are not to be kept; or to call to a passer-by that there is a spot of mud upon his face, or the like. When he falls into the snare, the term April fool or gowk is applied with a shout of laughter.

A prio'ri. *A priori* reasoning, in Kant's use of the term, is that which rests on general notions or ideas, and is independent of experience; which is derived from the constitution of the mind, and is accordingly prior to all experience. But the word is used loosely in various senses; sometimes for reasoning from a general principle to its consequences; sometimes from observed facts to another fact or principle not observed; still more loosely for arguing from pre-existing knowledge, or even from cherished prejudices ('innate ideas' would be *a priori*). The Aristotelian usage made *a priori* reasoning from cause to effect; *a posteriori* from effect to cause. Now usually, reasoning from experience is called *a posteriori* reasoning. A predilection for one or the other of these forms of reasoning forms one of the most important distinctions among schools of philosophy. Plato and most of the great Germans may be taken as typical of the *a priori* school, Bacon and Locke of the empirical or experimental. *A priori* philosophy claims for its conclusions the character of necessary truths, and denies that there can be *a posteriori* proof of anything, that kind of reasoning furnishing only a confirmation or verification. The opposite school maintain that the general notions or principles on which *a priori* reasoning rests are themselves the results of experience, and that, therefore, all truth rests really on *a posteriori* grounds. Synthetic and analytic, deductive and inductive, correspond in a general way to *a priori* and *a posteriori*. See ANALYSIS, DEDUCTION, INDUCTION, LOGIC, TRANSCENDENTALISM.

Apse (Lat. *apsis*), a semicircular or semi-octagonal recess usually placed at the east end of the choir or chancel of all early churches, up to and including those of the Romanesque and Norman styles. The origin of this peculiar termination to the choir is generally supposed to be as follows. It is believed that the heathen structure from which the early Christians borrowed the form of their churches, was not the temple but the Basilica or public hall, which served at once for a market-place and a court of justice. The Basilica was generally a parallelogram, at one of the shorter sides of which, opposite to the entrance, there was a raised platform destined for the accommodation of the persons engaged in, and connected with, the distribution of justice. This portion of the

building was the prototype of the rounded choir, to which the name of apse was given. For the prætor's chair, which was placed in the centre of this semicircular space, the bishop's seat was substituted. This theory has, however, been disputed; Professor Baldwin Brown, of Edinburgh, maintaining that the apse was common to the *schola*,



The Church of the Apostles, Cologne.
(From a Photograph.)

or meeting-room, of the Christian and other guilds under the Roman empire, and contained the seat of the president (see *From Schola to Cathedral*, 1886). Apses are to be met with in many English churches; but the structure is not only much more frequent, but continued to be used to a much later period on the Continent, and it may still be seen in almost every little village along the banks of the Rhine, and in the older churches of France and Italy. The lower part of the apse is usually pierced by two or three round arched windows, over which there is frequently an external arcaded gallery supported by small shafts; and the whole is joined to the end of the choir, which rises considerably above it, by a roof in the form of the segment of a cone. These features are all distinctly visible in the annexed illustration of the east end of the Church of the Apostles at Cologne, which is a typical example of Rhenish architecture. In this instance the transepts, as well as the choir, are terminated with round apses, thus producing a triapsal arrangement, similar to many churches in the East. The semicircular form of apse is of Roman origin, but many apses, especially in the south of France, are octagonal—a shape indicating a Byzantine influence. From 1100, some churches in Auvergne and the west of France began to adopt an aisle round the apse, and chapels were gradually introduced radiating from the aisle. These were ultimately developed in the 13th century into the splendid *chevets* of the great French cathedrals, such as Amiens and Beauvais. In Germany, numerous instances occur of churches with an apse at both the east and west ends. A few specimens are also found in the south of France. The western apse is supposed to represent the baptistery, which was originally a separate round building, but was afterwards absorbed into the main edifice in this form. Several examples of the apse are to be seen in the earlier ecclesiastical structures of Scotland; as instances, we may mention the churches of Dalmeny and Leuchars.

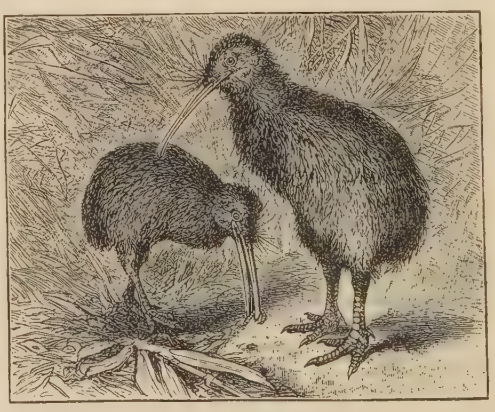
Apsheron, a peninsula on the west coast of the Caspian Sea, belonging to the republic of Azerbaijan. It is interesting for its volcanic condition, its burning naphtha wells, and its mud volcanoes. Its enormous petroleum industry is described at Baku (q.v.).

Ap'sides (Gr. *apsis*, 'connection'), the two extreme points in the orbit of a planet—one at the greatest, the other at the least distance from the sun. The term apsides is also applied in the same manner to the two points in the orbit of a satellite—one nearest to, the other farthest from, its primary; corresponding, in the case of the moon, to the perigee and apogee. A right line connecting these extreme points is called the line of apsides. In all the planetary orbits, this line has no fixed position in space, but makes a forward motion in the plane of the orbit, except in the case of the planet Venus, where the motion is retrograding. This fact in the orbit of the earth gives rise to the Anomalistic Year (q.v.). This advancing motion of the line of apsides is especially remarkable in the orbit of the moon, where it amounts to 40° 40′ 32″·2 annually, an entire revolution thus taking place in rather less than nine years. See MOON, PERTURBATIONS.

Apt (*Apta Julia*), a town in the French department of Vaucluse, 30 miles E. of Avignon. The cathedral dates from the 11th century, and parts of it from the 9th or 10th. There are Roman remains in and near the town. Pop. 5000.

Ap'terous Insects are insects without wings. In the Linnæan system, the Aptera formed a distinct order of insects, and included a large number of incongruous forms. Many of these have been distributed to other orders, and the remainder—e.g. Collembola and Thysanura, are regarded as survivors of primitive forms. The term is now rarely used except as a descriptive adjective, equivalent to wingless. See INSECTS.

Apteryx (Gr. *a*, 'without,' *pteryx*, 'wing'), or KIWI, a genus of New Zealand birds, belonging to the sub-class Ratitæ, in which the breastbone has no keel. It is thus allied to the ostrich-like birds.



Apteryx.

It is usually about the size of a large hen, but some measure two feet or more in height. The colour is reddish-brown or gray. Though incapable of flight, it is not really wingless; the rudimentary stump,

with short humerus and one complete digit, is merely hidden by the downy feathers which thickly cover the body. The barbs of the feathers are not united, and there is no aftershaft (see FEATHER). The short, scale-covered legs are strong, and enable the bird to avoid its enemies by rapid running. The three anterior toes are armed with strong claws, used in scratching and as weapons, while the posterior fourth toe is short and raised from the ground. The long, slender, rounded beak, with the nostrils at its tip, is largely used for pulling worms out of the ground. The bones of the body do not exhibit the usual air-cavities found in flying birds. The apteryx lies during the day in holes in the ground, or at the foot of trees, and comes out in the twilight. They feed on worms, grubs, and also 'hinau berries.' They make a peculiar snuffing noise when hunting or feeding. They live in pairs, and the female lays, apparently twice a year, a very large egg, which is deposited in a hole at the foot of a tree or tree-fern. The male takes some share at least in the labour of incubation. Four species have been distinguished, two in North Island and two in South Island of New Zealand. It is somewhat uncertain whether they are really distinct.

Aptornis, a genus of extinct Rallidæ whose remains are found in New Zealand with those of the Moa; see NOTORNIS.

Apuleius, or APPULEIUS, a Latin satirist of the 2d century, was born at Madaura, in Africa, where his father was a magistrate and a man of large fortune. Apuleius studied first at Carthage, and afterwards at Athens, displaying a special predilection for the Platonic philosophy. He visited Italy, Asia, &c., and was initiated into numerous religious mysteries. The knowledge thus acquired of the priestly fraternities he made abundant use of afterwards in his *Metamorphoses*, better known as *The Golden Ass*. Having married a wealthy middle-aged lady, he was charged by her relations with having employed magic to gain her affections. His *Apologia*, still extant, was an eloquent and successful vindication of his conduct. Henceforward his life appears to have been devoted zealously to literature and public oratory, in both of which he attained great eminence. The *Golden Ass*, the work by which his reputation has survived, is a romance, which is generally understood to have been intended as a satire on the vices of the age, especially those of the priesthood, and of quacks or jugglers affecting supernatural powers, though Bishop Warburton fancied he could detect in it an indirect apology for paganism. Its merits are great and conspicuous, as are also its faults. Wit, humour, satire, fancy, learning, and even poetic eloquence abound, but the style is disfigured by excessive archaisms and by a frequent affectation in the metaphors. The most exquisite thing in the whole work is the episode of Cupid and Psyche. We have also from the pen of Apuleius an Anthology, a work on the Dæmon of Socrates, one on the doctrines of Plato, &c.

Adlington's translation (1566) of the *Golden Ass* was republished by Whibley in 1893 and Seccombe in 1915. There are also translations by Taylor (1822), Sir G. Head (1851), F. D. Byrne (1904), and H. E. Butler (1909–10). Apuleius was edited by Van de Vliet (*Metamorphoses*, 1897; *Apologia* and *Florida*, 1900). And see Purser's edition of the Cupid and Psyche episode (1910).

Apu'lia (modern *le Puglie*), the south-eastern part of Italy as far as the promontory of Leuca, comprising the provinces of Bari, Brindisi, Foggia, Lecce, and Taranto, with an area of 8540 sq. m., and a pop. (1921) of 2,297,061. In ancient times it extended from the river Frento to the promontory Iapygium, and was bounded on the west by Samnium and Lucania, on the north by the Frentani. More strictly defined, it was the country east of Samnium, on both sides of the Aufidus—the Daunia and Peucetia of the Greeks. The latter frequently applied the name Iapygia to include all Apulia. The inhabitants of Apulia formed three distinct peoples—the Messapians or Salentini, the Peucetii, and the Dauni or Apulians. Its principal cities were Arpi, Luceria, and Canusium. They first appear in history as concluding a treaty with the Romans, in 326 B.C., against the Samnites; but this they soon after repudiated, and in 317 all the Apulian cities submitted to Rome. The second Punic war was for some time carried on in this province, the battle of Cannæ (216 B.C.) being fought within its borders, and many of its cities were severely punished by the Romans for siding with Hannibal. A like fate overtook them at the close of the social war in 89 B.C., and the district has never since recovered its ancient wealth and prosperity. It is but a shadow of its former self in the time of the Greek colonies, under Roman dominion, or even under the Normans, who made a duchy of it in 1043 A.D. Most of the towns are depopulated, and agriculture is in a very low condition. See Gregorovius's *Apulische Landschaften* (4th ed. 1897).

Apu're, a navigable river of Venezuela, which rises near the western boundary among the Eastern Cordillera, and flows nearly 1000 miles eastward, past the towns of Nutrias and San Fernando, till it falls by six arms into the Orinoco.

Apu'rimac, a river of Peru, also called *Tambo*, which, after a northward course of 500 miles, helps to form the Ucayali, and finally joins the Amazon, of which it is one of the most southerly tributaries. It gives name to a province of Peru, with an area of 8200 sq. miles, and a population of over 170,000.

Aqua Fortis (literally 'strong water') was the term used by the alchemists to denote nitric acid, and is still the commercial name of that acid.

Aquamarine, a name sometimes popularly given to the Beryl (q.v.), as being 'sea-coloured.' Some green and blue varieties of topaz have also been so styled.

Aqua Regi'næ (literally 'queen's water') is a mixture of concentrated sulphuric acid (oil of vitriol) and nitric acid, or of sulphuric acid and nitre. Either mixture evolves fumes largely, and may be used as a disinfectant.

Aqua Regis, or REGIA (literally 'royal water'), is the common name applied to a mixture of 1 part of nitric acid, and 2, 3, or 4 parts of hydrochloric acid. The general proportion is 1 to 2. The term aqua regia was given to the mixture from the power it possesses of dissolving gold, which is the *king of the metals*.

Aqua'rium, some contrivance on a large or small scale for keeping aquatic animals and plants alive out of their native habitat. Though the custom of keeping fish alive in tanks (*vivaria*) had been for long resorted to as a matter of domestic convenience, it is only since the middle of this century that the scientific and æsthetic value of aquariums has been appreciated. The Scottish naturalist Sir John Dalyell was one of the first (from 1790 onwards) to utilise simple aquariums for scientific purposes, and the almost historic long-lived sea-anemone 'Grannie' was one of his prisoners. In 1842 Johnston described the successful establishment of a small but well-peopled aquarium. Ward, Gosse, Warrington, and others did much to make both fresh-water and marine collections practicable and popular, and though the fresh enthusiasm that they called forth has to some extent died away, the number of public

and scientific aquariums has greatly increased. The large aquariums at Brighton and Hamburg are deservedly famous, and many others have been established both in towns for popular instruction and at the various zoological marine stations for purposes of scientific study. The first scientific and popular aquarium was that erected in the London Zoological Gardens in 1852. A new aquarium was opened there in 1924. Edinburgh began with fresh water only in 1927. The Berlin Aquarium is a good instance of a well-managed collection at a considerable distance from the sea, while that in connection with the Naples Zoological Station has proved a most valuable acquisition in studying the habits and life-histories of marine plants and animals.

Fresh-water aquariums, though less decorative and interesting, are on some scale possible to every one, while the ready importation of sea-water or its artificial preparation makes it quite feasible for even inland residents to keep marine plants or animals in good condition. Since 1841 various recipes have been given for the artificial preparation of sea-water—e.g. by mixing with rather less than 4 quarts of spring-water 3½ ounces of common table-salt, ¼ ounce Epsom salts, 200 grains of chloride of magnesium, and 40 grains of chloride of potassium. Into this sea-lettuce (*Ulva*) and other seaweeds should first be placed. For a successful aquarium careful aeration is essential; and this is effected either simply by the aid of a syringe, or by mechanical contrivances of fountain, drip-glass, &c., and as far as possible also by regulating the proportion of plants and animals, since these compensate one another in their relations to the atmosphere. Abundant light and careful purification are also necessary. Dead specimens must be removed before decomposition, and the water filtered when it shows signs of losing its clearness and fresh smell. Concentration of the sea-water through evaporation, original impurities in the water (which is best conveyed in fir-wood or stoneware vessels), contamination by dust, overcrowding, and the like, must obviously be avoided. As to the stock, experience is the surest though slowest guide; but hints can be obtained by consulting popular works on marine plants and animals—P. H. Gosse's *Aquarium* (1854), and more modern works, such as that of Hughes. Kingsley's *Glaucus* is also of permanent interest to beginners.

Aqua'rius ('the Water-bearer'), the eleventh sign of the zodiac, through which the sun moves in part of the months of January and February. See ZODIAC.

Aquatic Animals. Apart from any speculations as to the more or less watery nook where the first forms of life were cradled, it is worth noting that the home of almost all the simpler animals is distinctly and necessarily aquatic. While a few of the Protozoa, such as one of the Amœbæ, occur in damp places on land, or within other organisms, the vast majority live freely in the water, and the same is true of the Sponges, Cœlenterates, and Echinoderms. Among worms, however, more emphatic exceptions occur, such as the earthworm, where the structure and habit of the animal has become distinctly adapted to terrestrial life. While the great majority of crustaceans again are aquatic, a few, such as the wood-louse and the land-crab, are modified for life ashore. The crowd of insects, spiders, and myriapods are of course terrestrial or aerial, though here also the habits of some adult forms, and the life of some of the young, are distinctly aquatic. Among molluscs also there is an equally familiar occurrence of both aquatic and terrestrial habit, while numerous forms illustrate the transition from the former to the latter. The ascidians are exclusively marine. Some fishes have a limited power of life out of the water, the double-breathing Dipnoi (q.v.) being in this connection especially instructive. Among many amphibians, the transition from water to terra-firma is seen in the individual life-history, when the fish-like gilled tadpole becomes the lunged gill-less frog; while in a few exceptional cases, such as the black salamander of the Alps, the life is terrestrial from first to last, and even the young dispense with their preliminary swim as tadpoles, although a brief recapitulation of their aquatic life is still represented by a gilled stage within the body of the parent. The instance of the gilled Axolotl (q.v.) becoming, in the absence of sufficient water, the gill-less Amblystoma, forcibly illustrates the importance of the medium as a factor in evolution. Among reptiles there are numerous aquatic forms—chelonians, lizards, snakes, and crocodiles, though the absence of any gill-respiration marks the progressive general adaptation to terrestrial life. While an emphatically terrestrial amphibian like the tree-frog seeks a watery hole for the rearing of the young gill-breathing tadpoles, the habit is reversed in such reptiles as the sea-turtle, which having returned to the more primitive aquatic home, yet revisits the land for egg-laying purposes. The cradle of the young in both cases indicates the ancestral habit of the parent. Among the emphatically aerial birds, there are cases like that of the penguin, where the structure has become adapted to an almost exclusively aquatic life. And so among mammals, the sea-cow, the seal, and the whale are familiar illustrations of very different types which have returned to the primeval watery home and aquatic habit, with consequent change of structure.

To sum up the adaptations to aquatic life would obviously be to attempt to compress a large department of comparative physiology. It is more important simply to note the general fact that, in the water, animals are subjected to influences somewhat different in detail from those which mould their congeners ashore. Even contact with a different medium, varying in composition, in currents, in pressure, in contained food and oxygen, and the like, obviously involves a great diversity in structure. Modes of motion, from the swimming bell of a medusoid contracting and expanding in the tide, to that of the lowest vertebrates as illustrated in the pelagic Tunicates, or from the paddling of worm and crustacean to that of fish and frog, duck and seal, are at once familiar adaptations to, and necessary results of aquatic life. Similarly, the smooth and frequently fish-like form, especially of actively locomotive water-animals, is a very noticeable adaptive result of the conditions of life. In the more thoroughly aquatic animals, which have remained in the primitive environment, and have not merely returned to it, the blood is usually purified by being spread out on feathery gills which catch the oxygen dissolved in the water; while in terrestrial forms which have betaken themselves to an aquatic life, the ordinary direct 'air-breathing' is still accomplished at the surface of the water, or in some isolated cases of insects and spiders, by means of the air entangled in their hairs, or even conveyed into their submerged homes. The aquatic respiration of some larval insects, the power that some crustaceans and fishes have of keeping up a respiration on land with a minimum of water about their gills, and above all, the cases of the double-breathing fishes or dipnoi, and of amphibians already referred to, are specially instructive in regard to the problem of transition from one medium to the other. The genuinely aquatic animals are known to have a body temperature not much higher than that of the surrounding

medium, and often survive even the freezing of the water; while in the higher warm-blooded vertebrates which have returned to an aquatic habit, various modifications, such as thick fur and plumage, waterproof varnish, formation of blubber, serve as protections against the cold. The sensitiveness of many forms to changes in the volume, movement, and composition of the water, the importance of the aquatic habit in relation to the dispersion of types, the power exhibited by some of the lower animals in avoiding death or at least extinction during drought, will be discussed in the articles on ENVIRONMENT, GEOGRAPHICAL DISTRIBUTION, and DESICCATION.

Aquatic Plants. The presence of water is not only essential to the active life of all organisms, but is peculiarly necessary for plants which are for the most part dependent for food-supply on matter dissolved in water, as well as on the carbonic anhydride mingled with the surrounding medium. Numerous plants are, moreover, in the strict sense of the word aquatic, having never acquired or having lost all direct connection with the soil. The simplest plants or Algæ are almost all aquatic, though many occur in damp situations on land, or on other organisms, while others remain for long periods quiescent in comparative dryness. Many Algæ are absolutely isolated in the water, while others are more or less intimately fixed to some solid substratum. Fungi are very seldom found in water, and lichens are also emphatically terrestrial. Some Liverworts, again, occur floating in lakes, but the majority grow in very damp places, and mark the transition to the generally terrestrial life of mosses and ferns. Some Rhizocarps, such as Salvinia, are aquatic, with leaves rising to the surface, while others are land or marsh plants, like the higher horse-tails and club-mosses.

Among the flowering plants or phanerogams, a return to aquatic life is exhibited by numerous, though exceptional cases, while a very large number grow in moist situations, and have a semi-aquatic habit. The simple Monocotyledons known as Helobiæ (q.v.) or marsh-lilies are more or less strictly water-plants. The Arrow-head, q.v. (*Sagittaria*), and other Alismaceæ; the *Butomus* of the marshes; *Hydrocharis*, with floating kidney-shaped leaves; the water-soldier (*Stratiotes*), with narrow submerged leaves; and the Canadian pond-weed (Elodea; see ANACHARIS), which, though rarely flowering in Europe, threatens to choke some canals and lakes, are familiar representatives. The little duck-weed (*Lemna*) floating on the surface of stagnant pools is one of the commonest aquatic Monocotyledons; and the pond-weeds found both in fresh and salt water; the lattice-plant (*Aponogeton*, see fig. 1), with its skeleton leaves; various estuarine and fresh-water Naiadaceous plants—e.g. *Zostera* and *Naias*, are also common instances, while those growing in marshy ground are much too numerous to mention. Among Dicotyledons, the white water buttercup (*Ranunculus aquatilis*), with its slightly divided floating, and much dissected submerged leaves; the yellow and white water-lilies (*Nymphæa*); the sacred lotus-flower of the Ganges and Nile (*Nelumbium*); the gigantic *Victoria regia* of tropical South America; and the insectivorous bladderwort or *Utricularia*, are among the most familiar aquatic forms.

Numerous modifications have naturally resulted in adaptation to aquatic life. The roots growing out in a relatively frictionless medium may become, as in *Hydrocharis* and *Pontederia* (see ROOT), long and delicate, covered with numerous and uniform root-hairs, which thus expose a large absorbing surface. In *Utricularia*, on the other hand, where the whole plant is submerged with the exception of the flower-stalk, root-structures are not developed at all. The leaf-stalks of a *Pontederia* growing in the water, show, when contrasted

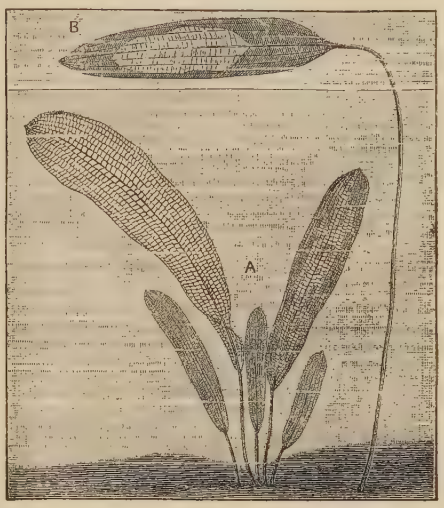


Fig. 1.
A, Madagascar Lattice-leaf (*Ouvirandra fenestralis*, or *Aponogeton fenestrale*), showing open fenestrated leaves in adult state, with young leaves at first entire, and showing, as they develop, the progressive rupture of parenchyma between the fibro-vascular bundles ('veins').
B, Leaf of Pond-weed (*Aponogeton*), to show floating type (entire) with same venation.

with those of another growing on land, an enormous development of air-spaces, which serve to buoy up the floating plant. Submersion seems to increase the surface of leaves at the expense of their thickness, and this in Monocotyledons usually

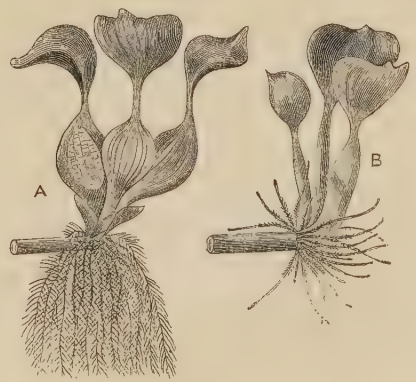


Fig. 2.
A, *Pontederia crassipes* of Amazon: ordinary floating form with air-spaces in leaf-stalks, and branched roots.
B, a runner which has taken root on land, and accordingly reverted to the ordinary form of root and leaf-stalk.

results in elongation in one direction (*Sagittaria*, *Vallisneria*, &c.), and in Dicotyledons, in the development of numerous capillary divisions, as in *Ranunculus aquatilis* and *Myriophyllum*. The change may sometimes be experimentally demonstrated by artificial change of environment, while the foliage of *Sagittaria*, *Alisma*, *Nuphar*, &c. is very different, according as the leaves are submerged, floating, or aerial. In aquatic plants, the Stomata (q.v.) are usually absent or scarce on the lower surface of the floating leaves, and on both sides of the submerged; and many more intimate

changes, such as the disappearance of hairs, the occurrence of chlorophyll in the epidermis, and so on, have been repeatedly observed to follow change to an aquatic medium. Some plants, such as *Zostera*, even flower under water, but an exposure and relative drying at the surface has been shown to be in some cases essential to the germination of the seeds. The fruits of the water-lily keep afloat by means of large air-spaces, and those of the arrow-head are protected by a thick oily rind. The whole subject of the adaptive modifications of aquatic plants is obviously a special case of the general problem of the relation between organism and environment, and for further details reference must be made to the separate articles on some of the plants cited as instances, and to ENVIRONMENT.

Aquatint, a mode of etching on copper, by which imitations of drawings in Indian ink, bister, and sepia are produced. On a plate of copper a ground is prepared of black resin, on which the design is traced; a complicated series of manipulations with varnish and dilute acid is then gone through, until the desired result is attained. See ENGRAVING, and a monograph by Prideaux (1910).

Aqua Tofa'na, a mysterious poisonous liquid, applied to criminal purposes by a Sicilian woman named Tofana, about the end of the 17th century. Many wonderful stories are told of the great efficacy of this poison, but the best toxicologists believe that it was principally a solution of arsenic. See POISON (*Secret Poisoning*).

Aqua Vitæ (Lat., 'water of life') is a common term applied to ardent spirits; especially, in commerce, spirits of the first distillation, or unrectified. During the alchemical epoch, brandy or distilled spirits was much used as a medicine, was considered a cure for all disorders, and even got the credit of prolonging life. French *eau de vie* (brandy) has the same meaning, as well as our words *whisky* and *usquebaugh;* the former a Scotch, the latter an Irish form, from a common Gaelic and Irish, *uisge bheatha.*

Aquaviva (Claudio Acquaviva; 1543–1615), fifth general of the Jesuits, belonged to an old Neapolitan family. Entering the order at the age of twenty-five, he became its head thirteen years later. His principal work was the organisation of the body, and his ordinance regulating the studies of the Jesuits became famous under the title 'Ratio Studiorum' (1586).—For Cardinal Giulio Acquaviva, see CERVANTES.

Aqueduct. This term is perhaps most commonly understood to mean a bridge of stone, iron, or wood, for conveying water across a valley. But a pipe, an open channel, or a tunnel through a mountain is equally an aqueduct, if its function is to convey water from one place to another. All great aqueducts have been constructed for the purpose of conducting water from some more or less distant source to large towns or cities. The term is also properly applied to a bridge carrying a canal for the purposes of navigation.

Roman Aqueducts.—The aqueducts of the Romans were amongst the most magnificent of their works, and the noble supply of water which modern Rome derives from the four now in use, of which three are ancient, gives the stranger a very vivid conception of the vast scale on which the ancient city must have been provided with one of the most important appliances of civilisation and refinement, when nine were employed to pour water into its baths and fountains. The bridge portions of an ancient Roman aqueduct consist most frequently of one row of arches, but sometimes, as in the annexed figure (fig. 1), of two, and occasionally, when the height is great, even of three tiers. Some of these were built of hewn stone and others of brick, but in nearly every case they were very substantially constructed. Several of them, indeed, after the lapse of two thousand years, have been put in repair and used again as modern aqueducts. The water-channel in one or two of the larger ones is about

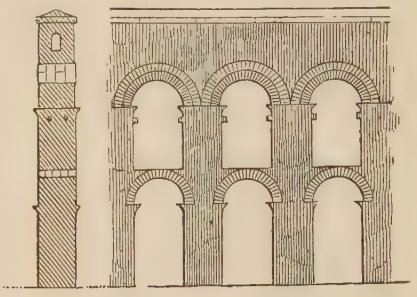


Fig. 1.—Aqua Alexandrina.

5½ feet high and 4 feet wide. This was, of course, formed in the upper part of the structure, above the arches, and was covered on top, bottom, and sides with a lining composed of lime, sand, and pulverised brick, which in time acquired the hardness of stone. The declivity of these ancient aqueducts was generally about 1 in 200, a much greater slope than is given to modern works of a similar kind. Reservoirs (*castella*) were built at regular intervals along the aqueducts to enable repairs to be made, and to supply water, where necessary, to the inhabitants of the outlying districts.

Of the nine aqueducts which brought water to ancient Rome, three still supply the modern city. (1) The *Aqua Virgo*, now called *Acqua Vergine*, which was restored by Pope Nicholas V. in 1453. This name is said to have originated from a young girl having pointed out the spring at its source to some soldiers. The aqueduct was made by Agrippa, and finished about the year 27 B.C. It mainly consists of a subterranean channel 14 miles in length, and supplies daily about 13,000,000 cubic feet of excellent water. (2) The *Aqua Trajana*, restored by order of Paul V. in 1611, hence its modern name of *Acqua Paola.* It stretches from Rome to the lake of Bracciano, a distance of 31 miles. (3) The *Aqua Marcia*, constructed by the prætor Q. Marcius Rex in 146 B.C. This is 56 miles in length, and is very little shorter than the longest of the ancient aqueducts at Rome. It was restored so recently as 1869, and brings a supply of water from the Sabine Mountains. The noble arches which stretch across the Campagna for some 6 miles on the road to Frascati are a portion of this aqueduct. Besides these three repaired ancient aqueducts, a fourth of comparatively recent date supplies modern Rome. This is the *Acqua Felice*, completed by Sixtus V. in 1585, and largely built of material taken from the arches—about 10 miles in length—of the ancient *Aqua Claudia.* The length of the *Acqua Felice* is some 13 miles, and two-thirds of it is subterranean.

Provincial Roman Aqueducts.—Away from the capital there are a number of ancient Roman aqueducts in Italy itself. The ruins of one exist at Mayence, and of another near Metz, in Germany. France possesses, in the Pont du Gard at Nîmes (fig. 2), erected in the time of Augustus, one of the finest and most perfect of the aqueduct-bridges built by the Romans. It is higher than any about Rome itself, being fully 180 feet in height, and the length of its highest arcade is 873 feet. Spain has also interesting Roman works of this kind at Segovia, at Tarragona, and at Merida. The one at Evora, in Portugal, is still in excellent preservation.

Spoleto Aqueduct.—As forming a link between the ancient Roman structures and the great aqueduct-bridges of modern times, that of Spoleto,

Fig. 2.—Pont du Gard, Nîmes.

about 60 miles to the north-east of Rome, should be mentioned. Erected in the 6th or 7th century, it serves both as a bridge and as an aqueduct, and is a wonderful piece of engineering for its time. The very tall piers are built of a durable stone, and the pointed arches are of brick. It is about 300 feet high, nearly 700 feet long, and the ten great arches have each a span of 66 feet. These are surmounted by a row of much smaller arches carrying the canal of the aqueduct. There exists some doubt as to whether the arches of this very interesting bridge are not of considerably later date than the piers.

Maintenon Aqueduct.—Many centuries elapsed before another aqueduct of special interest or importance was undertaken in Europe. In 1684 Louis XIV. set his engineers to construct an aqueduct to convey the waters of the Eure from Point Gouin to Versailles. Troops to the number of 40,000 were employed in this great undertaking. Thousands of these men died during the progress of the work, which was interrupted during the war of 1688 and never resumed. The bridge at Maintenon, forming part of this aqueduct, even in its incomplete state, is, in point of magnitude, the grandest structure of the kind in the world. The remains consist of forty-seven arches, each 42 feet wide and 83 feet high. The piers are 25 feet 6 inches thick.

Marseilles Aqueduct.—The aqueduct, 60 miles in length, which conveys water from the river Durance to Marseilles, is another magnificent specimen of French engineering. It was finished in 1847.

Croton Aqueducts.—New York is supplied with water from the Croton River, which falls into the Hudson. The aqueduct at present in use was constructed between the years 1837 and 1842. It is 38 miles long, with a declivity for the greater part of its course of 13¼ inches to the mile. For a length of 33 miles the water-channel is 8 feet 5 inches in height, and 7 feet 8 inches in greatest breadth. Stone, brick, and cement are used for the encasing masonry, which varies slightly as the channel is formed in rock, or earth, or in an open cutting. In flat valleys the built conduit has sloping earth embankments on each side. When it reaches the Harlem River the water is conveyed in iron pipes over a splendid bridge. These large pipes also connect the receiving and the distributing reservoirs, which are two miles apart.

This first Croton aqueduct, though justly considered one of the grandest modern works of its kind, has been found to be totally inadequate for New York. Accordingly a new aqueduct on a more stupendous scale was constructed in 1883–90, with a dam of vast size (1350 feet long, 277 high, 216 wide). For more than 28 miles the conduit or water-channel is tunnelled through solid rock, at a depth of 150 feet below the surface, and is generally 14 feet high and wide. It passes under the Harlem River at a depth of 300 feet below the river-bed, and cost $25,000,000 (see the articles NEW YORK, WATER). The port of Mollendo in Peru has an iron aqueduct of 85 miles laid along the railway from Arequipa.

Manchester.—Very large works were constructed in 1868–77 to bring water from Longdendale to Manchester. In the greater scheme for bringing water from Lake Thirlmere in Cumberland (1885–94), the length of the line is nearly 100 miles. A tunnel, three miles long and 270 feet below the surface, forms the first part of the aqueduct. The distance is close on 100 miles (95¾ to Prestwich reservoir)—13¾ in tunnels, 38 in shallow tunnels cut from the surface, and 44½ miles in siphon pipes of 40 inches diameter. The aqueduct passes under Dunmail Raise, north of Grasmere, Ambleside, Windermere, and Kendal, east of Lancaster and Preston, across Lune and Ribble, past Chorley, and west of Bolton. The ultimate supply is 50,000,000 gallons daily, and the cost £4,500,000.

Birmingham and Midlands.—The Birmingham water-supply (inaugurated 1904), bringing water from the counties of Cardigan, Radnor, Brecknock, and Montgomery to Birmingham, has a total length of 73 miles of aqueduct.—The Midland water scheme to impound the waters of the rivers Derwent and Ashop for the supply of the towns of Leicester, Derby, Sheffield, and Nottingham, and the counties of Derby and Notts, has about 100 miles of aqueduct for the distribution of the supply.

Glasgow.—An aqueduct from Loch Katrine, 35 miles long, was begun in 1855 and completed in 1860. The tunnelled portion is 13 miles in length, and is 8 feet high and 8 feet wide, with an inclination of 10 inches in a mile. Siphon pipes of cast-iron are laid across the valleys, having an inclination of 5 feet in a mile. The ravines are crossed by aqueduct-bridges of varying character. Where they are deep they are crossed by wrought-iron tubes, 8 feet wide by 6½ feet high, supported by stone piers 50 feet apart. Over small mountain-streams the aqueduct consists of cast-iron troughs, supported on beams of the same material. In those portions of its course where suitable rock is abundant, some of the bridges are of freestone. There is one tunnel at the commencement of the aqueduct, near Loch Katrine, 2325 yards long, and at the other end, near Glasgow, the Mugdock tunnel is 2640 yards in length. A great additional supply from the same source, increasing the daily provision from 50,000,000 to 100,000,000 gallons daily, was secured by new works completed in 1889–95, which constitute practically a complete duplicate of the former ones (with a distinct reservoir, &c.). The cost of both systems has been about £3,000,000.

Liverpool Aqueduct.—Another aqueduct of great magnitude was constructed in 1881–92 for the supply of water to Liverpool from the river Vyrnwy (q.v.) in Wales. Its total length is 68 miles. It consists partly of tunnel and partly of three parallel lines of iron pipes. The first (Hirnant) of the three chief tunnels is 2¼ miles long, 7 feet in diameter, and has a gradient of 1 in 2340. The cost was about £2,500,000.

Vienna Aqueduct.—This aqueduct is nearly 60 miles long, and was finished in 1873. The springs are at the foot of the Styrian Alps, and are about 1150 feet above the level of the Danube at Vienna. The size of the section of the conduit or waterway varies, but it nowhere exceeds 6 feet 6 inches in height, by 4 feet in width. At several places in its course there are extensive aqueduct-bridges, and these are built either entirely of stone, or of stone and brick; one has forty-three arches. This aqueduct supplies 20 million gallons of water per day. It cost about two million pounds sterling.

Bombay Aqueduct.—A gigantic scheme for the supply of Bombay from the river Tansa (q.v.), 65 miles N. of Bombay, was completed in 1886–92. The aqueduct consists mainly of two lines of cast-iron pipes, 48 inches in diameter, which here are allowed, for the most part, to lie on the surface of the

ground. There no frost can injure them, and any leakage can be at once seen.

Canal Aqueducts.—Of aqueduct-bridges for carrying navigable canals across rivers or valleys, the finest in Great Britain is that built by Telford over the Dee in Wales. Another fine bridge of this kind, designed by Rennie, crosses the river Lune. In Scotland there is one at Slateford, near Edinburgh, and another over the Kelvin at Glasgow.

Aqueous Humour, the watery fluid which fills the space in the eye between the cornea and the lens. See EYE.

Aqueous Rocks, rocks which owe their origin to the mechanical or chemical action of water. In some systems of classification, the term is synonymous with *sedimentary rocks.* See GEOLOGY.

Aquifoliaceæ, the holly family, are archichlamydeous dicotyledons allied to Rhamnaceæ and Celastraceæ. They are all shrubs or trees, and are chiefly natives of tropical and subtropical America. The most interesting species belong to the genus Ilex. See HOLLY, MATÉ.

Aq'uila, the capital of the Italian province of the same name, beautifully situated on the Alterno, near the loftiest of the Apennines, 64 miles SE. of Terni by a railway opened in 1884. It was built by the Emperor Frederick II. from the ruins of the ancient *Amitérnum*, a town of the Sabines, and the birthplace of Sallust the historian. In 1703 it was almost destroyed by an earthquake, in which 2000 persons perished. Aquila, which is a bishop's see, is a busy place, and besides a large trade in saffron, which is the principal product of the surrounding district, the manufacture of paper, linen, and wax is carried on. Pop. 24,000. The province of Aquila is most picturesque, snow-topped mountains and smiling valleys alternating. Area, 1945 sq. m. ; pop. (1921) 325,573.

Aq'uila, PONTICUS, a celebrated translator of the Old Testament into Greek, born at Sinope. He flourished about the year 130 A.D., is said to have been related to the Emperor Hadrian, and to have been first a pagan, then a Christian, and finally a Jew ; submitting in his last conversion to circumcision. His translation of the Old Testament—which appears to have been undertaken for the benefit of his Hellenised countrymen—was so *literal*, that the Jews preferred it to the Septuagint, as did also the Judaising sect of Christians called Ebionites. The version was praised by both Jerome and Origen, and such fragments of it as remain may be found in the latter's *Hexapla* (q.v.).

Aquilaria. See ALOES WOOD.

Aquilegia. See COLUMBINE.

Aquilei'a (also *Aglar*) is a small town in Italy, at the head of the Adriatic, 22 miles NW. of Trieste ; pop. about 3000. It is now sunk to utter insignificance, possessing no trade or public buildings of any note, except its cathedral ; but in the time of the Roman emperors, it was one of the most important places north of the metropolis, and was a central point of the transit-trade between the north and south of Europe. Founded by a Roman colony in 181 B.C., it was so strongly fortified by Marcus Aurelius, as to be considered the first bulwark of the empire against the northern barbarians. Here the Emperor Maximin perished ; and in the vicinity Constantius lost his life in a battle against his brother Constans. When the town was destroyed by Attila (452), it had 100,000 inhabitants. It never recovered, although it was rebuilt by Narses, but slowly dwindled into deeper obscurity. Councils were held at Aquileia in 381, 558, 698, and 1184 A.D. ; its bishops called themselves patriarchs, and claimed to rank next the pope. Austrian till 1919, it became Italian by the treaty of St Germains.

Aqui'nas, THOMAS (or *Thomas of Aquino*), the prince of scholastic theologians, was of the family of the Counts of Aquino, and was born about 1226 in the castle of Rocca Secca, near Aquino, a small town of 3000 inhabitants, halfway between Rome and Naples. He received the rudiments of his education from the Benedictine monks of Monte-Casino, and completed his studies at the university of Naples. A strong inclination to solitude and the religious life determined him, against the will of his family, to enter (1243) the order of Preaching Friars founded by St Dominic, who had been dead twenty-two years. In order to frustrate the attempts of his mother to remove him from the convent, he was sent away from Naples, first to Rome and then to Paris ; but his brothers took him by force from his conductors, and carried him to the paternal castle. Here he was guarded as a prisoner for two years, when, by the help of the Dominicans, he contrived to escape, and went through France to the Dominican convent at Cologne, in order to enjoy the instructions of the famous Albertus Magnus (q.v.). According to another account, he owed his release from confinement to the interference of the emperor and the pope. At Cologne he pursued his studies in such silence, that his companions gave him the name of the 'Dumb Ox.' But Albert is said to have predicted 'that this ox would one day fill the world with his bellowing.' In 1248, being 22 years of age, he was appointed by the general chapter of his order to teach at Cologne, together with his old master, Albert. He now began to publish his first works, commentaries on the ethics and the philosophy of Aristotle. In 1252 he was sent to Paris. His masterly application of this philosophy to the systematising of theology, soon procured him a distinguished reputation. It was not, however, till 1257 that Aquinas and his friend St Bonaventura, the Franciscan, obtained their degree of doctor, as the university of Paris, under the influence of William de St Amour, was hostile to the mendicant friars. He vindicated the principles of these orders in an important work ; and, in a disputation in presence of the pope, procured the condemnation of the books of his adversaries. He continued to lecture with great applause in Paris, till Urban IV. in 1261 called him to Italy to teach in Rome, Bologna, and Pisa. It was at this time he composed most of his great works.

Even during his life Aquinas enjoyed the highest consideration in the church. His voice carried decisive weight with it ; and his scholars called him the 'Angel of the Schools' or 'Angelic Doctor.' A general chapter of Dominicans in Paris made it obligatory on the members of the order to defend his doctrines. Both Urban IV. and his successor, Clement IV., who were much attached to Aquinas, pressed upon him the highest ecclesiastical dignities in vain. So great was his modesty, and his love of poverty and study, that he refused the archbishopric of Naples.

Like most of the other scholastic theologians, he had no knowledge of Greek or Hebrew, and was almost equally ignorant of history ; but his numerous writings display an intellectual power of the highest order. He gave a new and scientific foundation to many doctrines of his church, especially that of transubstantiation. He also treated Christian morals according to an arrangement of his own, and with a comprehensiveness that procured him the title of the 'Father of Moral Philosophy.' The definiteness, clearness, and completeness of his method of handling theology were such that his *Summa Theologiæ*, which may be said to be the first attempt at a complete theolo-

gical system, remains to this day substantially the standard authority in the Roman Church. Another important work of Aquinas is his *Summa contra Gentiles*, which deals chiefly with the principles of natural religion. His commentaries on Scripture and devotional treatises also have a high reputation. His influence on the theological thought of succeeding ages was immense. At the council of Trent, the *Summa* was honoured with a place on the table by the side of the Bible. It was at Bologna that he began this his greatest work, by which his name will always be connected, but which he never lived to complete. A legend tells how, when engaged in fervent prayer regarding this book, he heard the words from his crucifix: 'Thou hast written well of me, Thomas: what reward dost thou ask?' and he answered, 'None other but Thyself, O Lord.' On December 6, 1273, he was writing at Naples the 90th question of the third part of the *Summa*, when weakness of health compelled him to break off his studies. But Gregory X., who had called a general council to effect the union of the Greek and Latin churches, summoned Aquinas to defend the papal cause at Lyons, where the council was to meet on May 1, 1274. He set out, though suffering from fever, and was surprised by death on the road at the Cistercian abbey of Fossa-Nuova, March 7, 1274. All Europe mourned his loss. Miracles were said to be wrought at his funeral. Universities, religious orders, and princes contended for the honour of possessing his body. It was finally bestowed by the pope on Toulouse, where it was received by 150,000 persons headed by Louis, Duke of Anjou. Aquinas was canonised by John XXII. in 1323, and proclaimed a 'Doctor of the Church' by Pius V. in 1567.

The only scholastic theologian who in any degree rivalled Aquinas in his own age, was the so-called 'Subtle Doctor,' Duns Scotus, of the order of St Francis. The Franciscans naturally followed Scotus, and the Dominicans Thomas, and henceforward medieval theologians were divided into two schools, Scotists and Thomists. The divergencies which penetrate more or less every branch of doctrine depend upon the different systems of metaphysics or scholastic philosophy upon which the theologies were based. The differences concerned the idea of God, the operations of grace and of justification, the mode in which the sacraments take effect, &c. Popularly, Scotism is best known for its advocacy of the Immaculate Conception of Mary, and for the doctrine, with which it is remotely connected, that the Incarnation would have taken place (though of course without suffering or death) if Adam had not sinned. The more recondite peculiarities of Scotist theology and philosophy are now almost entirely confined to the theologians of the Franciscan order. On the other hand, Thomism represents, with few exceptions, the general teaching of the Catholic Church. The school is now not so much opposed by the Scotists as by the eclectic school of Jesuit theology. The first complete edition of Aquinas's works was published in 17 vols. folio at Rome in 1570. They have been frequently reprinted, the latest and best edition having been begun in 1883 under the auspices of Leo XIII. The most convenient edition of the *Summa* is that of Migne (4 vols.). St Thomas was the author of *Pange Lingua* (q.v.), and other eucharistic hymns of the Roman Breviary.

See the Life by Archbishop Vaughan (1872; new ed. 1893), and those by Cavanagh (1890), Werner, Costelloe, and Conway (1911). There are many translations, and a volume of selected translations by O'Neill (1909).

Aquita'nia, the Latin name of a part of Gaul, originally including the country between the Pyrenees and the Garonne, peopled by Iberian tribes, and by Celtic families who settled among them. Augustus, when he divided Gaul into four provinces, added to Aquitania the country lying between the rivers Garonne and Loire. Afterwards it passed into the hands—first, of the West Goths, and then of the Franks; and during the Merovingian dynasty, became an independent duchy. Gascony, a duchy in the extreme SW., became in 1054, through the extinction of the male line, a part of Aquitania, which had come in the 10th century to be called *Guienne*, a corruption of its original name. In 1137 it was united to the crown of France by the marriage of Louis VII. with Eleanor, heiress of Aquitania. In 1152 it became an English possession, through the marriage of Henry II. with Eleanor, whom Louis had divorced, and it remained an appanage of the English crown until, in 1452, Charles VII. finally united it to France by the capture of Bordeaux.

Arabesque (Fr.), a peculiar kind of fantastic decoration, either sculptured or painted, which the Spanish Moors are supposed to have introduced into modern Europe. But the species of enrichment to which this term is now applied was extensively employed both by the Greeks and Romans, the latter in particular being masters of the style. The Egyptians, from whom the Moors probably derived their original notions of this and other forms of art, also employed it in their monumental decorations. The arabesque of the Moors entirely excluded the figures of animals, the representation of which was forbidden by the Mohammedan religion, and confined itself to the foliage, &c. of plants and trees, curiously and elaborately intertwined. This limitation was again departed from when the decorations were discovered on the walls of the baths of Titus, in the time of Leo X. More recently those in the houses at Herculaneum and Pompeii came to form the models of imitation, and the modern arabesque consists usually of combinations of plants, birds, and animals of all kinds, including the human figure, and embracing not only every natural variety, but stepping without hesitation beyond the bounds of nature. The arabesques with which Raphael adorned the galleries of the Vatican are at once the most famous and the most beautiful which the modern world has produced. See CELTIC ORNAMENT, MURAL DECORATION. The word has been transferred to music, and is the title of a well-known piano-piece by Schumann.

Arabesque Panel. (From the Mosque at Córdoba.)

Arabgir', or ARABKIR (anc. *Anabrace*), a town of eastern Anatolia, in a mountainous and rocky district, not far from the Euphrates, and on the caravan road from Aleppo to Trebizond; pop. 20,000. It owed its prosperity to the enterprise and industry of the Armenians. It is specially noted for the manufacture of goods from English cotton yarn.

Arabia—called by the inhabitants Jezirat-al-Arab (the peninsula of Arabia), by the Turks and Persians Arabistân—is the great south-western peninsula of Asia, and is situated 12° 40′–34° N. lat., and 32° 30′–60° E. long. Its greatest length from NW. to SE. is about 1800 miles; its mean breadth, about 600; its area, 1,230,000 sq. m.; and its population conjectured to be from 3,000,000 to 5,000,000. It is bounded on the N. by the high-

lands of Syria and the plains of Mesopotamia (or by a line from El Arish on the Mediterranean to the Euphrates delta), on the E. by the Persian Gulf and the Gulf of Omân, on the S. by the Arabian Sea, and on the W. by the Red Sea and the Suez Canal. Midway between Mecca and Medîna runs the tropic of Cancer. Ptolemy is supposed to be the author of the famous threefold division into *Arabia Petræa*—i.e. the Arabia of the city of Petra, in the NW.; *Arabia Felix*, a mistranslation of Yemen, which means not 'happy,' but on the *right*—i.e. to the ancients, the entire peninsula (viewed from Alexandria), but to mediæval Moslems (facing east) the land south of Mecca or south-west Arabia; and *Arabia Deserta*, at first merely the Syrian desert, later the whole interior. Modern divisions are: the *Sinaitic Peninsula* (see SINAI), between the Gulfs of Suez and Akaba; *Hedjâz* (the Barrier), along the Red Sea, with *Midian* in the north-west; *Yemen* (with *Asir* to the north), the southern strip on the Red Sea; *Hadramaut*, along the south coast; *Omân*, the south-eastern end of the peninsula; *El Hasa*, along the Persian Gulf; *Nejd*, the Central 'Highlands.'

In shape Arabia is an irregular parallelogram, broadest at the southern end; in character it is mainly African. The vast central plateau rises from a height of 2500 feet in the north to 7000 feet in the SW., and is bounded by western and southern mountain chains. The highest peaks rise in the NW., SW., and SE. corners—e.g. Jebel Katherin in Sinai (8540 feet); Jebel Manar, N. of Aden Protectorate (10,500 feet); Jebel Akhdar in Omân (10,000 feet)—and SE. of Mecca. Hedjâz and Yemen extend from the Red Sea indefinitely towards the interior, and consist partly of *Tehâma*, or low hot country, mostly sterile, along the sea, and partly of the mountain district beyond. Yemen is on the whole well watered, has rich and fertile valleys, grows coffee and cereals in the uplands, and is the most cultivated and most populated part of Arabia. Hadramaut is little known, but resembles the Hedjâz in character. Omân is mainly mountainous, and is partly very fertile. Hasa is comparatively level and fertile. Large portions of Arabia are perfectly arid; no river reaches the sea all the year round; one-third of the whole area may be accounted desert and uninhabitable.

Our knowledge of the interior of Arabia is still very imperfect in detail. The largest portion of it lies in that great desert zone which stretches from the shores of the Atlantic to those of the Northern Pacific. Nejd, the northern highland or central plateau of Arabia, is a compact settled district, culminating in the crescent-shaped Jebel Toweyk, which is intersected by numerous valleys, roaring torrents during the rains, but dry depressions at other times. North of Nejd, and separated from it by a narrow arm of desert, is the smaller plateau of Jebel Shomer, crossed by the ranges of Jebel Aja and Jebel Selma. Great Nafud, the northern desert, partly stony, and partly a burning expanse of red sand, is thinly sprinkled over with oases of wells and grass, serving as halting-places for the caravans of merchants or pilgrims. Jauf, Sakaka, and other oases lie between Great Nafud and the Syrian desert (*Hamad*) in the extreme north. From the south-east of Great Nafud, Little Nafud runs down to join *Dahna*, the southern and main desert of Arabia, which extends from Nejd to the Hadramaut coast-range, and has never been explored by any European. The east and west coasts are dotted with small islands. Pilgrim and caravan routes converge at the holy cities of Mecca and Medîna (in Hedjâz) and the ports Jiddah and Yambo (Hedjâz), Loheia, Hodeida and Mocha (Yemen), Aden, Makalla (Hadramaut), Muscat, (Omân), and Koweit (q.v.); at Sana, Haïl, Riâd, and El Hofuf (chief towns of Yemen, Shomer, Nejd, and El Hasa). The Hedjâz railway reached Medîna in 1908 on its way from Damascus to Mecca.

Political Divisions.—Sinai is part of Egypt. Hedjâz, Asir, and Yemen on the Red Sea, and El Hasa on the Persian Gulf, were provinces of Turkey till the Great War, though her hold on Asir especially was slight. The independent Emir (since 1921 Sultan) of Nejd (see WAHHÂBIS) in 1913 seized El Hasa, in 1921 Shomer or Jebel Shammar, in 1924–25 the Hedjâz and Asir. Yemen is independent; Omân more or less so. Aden is a British settlement and protectorate, with Hadramaut as its hinterland. Koweit is under British influence. The Bahrein Islands are also British. Kerak comes under the British mandate for Palestine.

Arabia has, on the whole, an African climate. Though it is surrounded on three sides by the sea, its mountain chains exclude in a great measure the modifying influence of currents of air from the ocean. In several parts of Arabia hardly a refreshing shower falls in the course of the year, and vegetation is almost unknown; in other sultry districts the date-palm is almost the only proof of vegetable life. Over large sterile tracts hangs a sky of almost unbroken serenity. The short rainy season which occurs on the west coast during our summer months fills periodically the *wâdis* (hollow places) with water, while slight frosts mark the winters in the centre and north-east. During the hot season the Simoom (q.v.) blows, but only in the northern part of the land. The terraced districts are more favourable to culture, and produce wheat, barley, millet, palms, tobacco, indigo, cotton, sugar, tamarinds, excellent coffee, senna, and many aromatic and spice plants, as balsam, aloe, myrrh, frankincense, &c. Arabia is destitute of forests, but has vast stretches of desert grass fragrant with aromatic herbs, and furnishing admirable pasturage for the splendid breed of horses. Coffee, one of the most important exports, is an indigenous product both of Arabia and Africa.

In the animal kingdom an African character prevails generally. Sheep, goats, oxen, camels, and horses are abundant among the settled inhabitants; the wandering tribes have no oxen. The noble breed of Arabian horses has been cultivated for several thousand years. The best are reared in Nejd; they never reach the European market. But the most characteristic of all animals in the peninsula is the camel, which has been both poetically and justly styled 'the ship of the desert.' It may be regarded as an Arabian animal, for it seems to be proved that it is not a native of Africa, but has migrated from the peninsula with its master. The breed of Omân is celebrated for its beauty and swiftness. Gazelles and ostriches frequent the oases of the deserts, where the lion, panther, hyena, and jackal hunt their prey. Monkeys, pheasants, and doves are found in the fertile districts, and flights of locusts often make sad devastation. Fish and turtle abound on the coast. Pearls are found in the Persian Gulf (especially round Bahrein), and mother-of-pearl in the Red Sea. Among the minerals of Arabia may be mentioned iron, copper, lead, coal, basalt, and asphaltum, and the precious stones, emerald, carnelian, agate, and onyx. Burton sought gold in Midian, but without avail. Salif, in Yemen, has salt-mines.

Inhabitants.—The most interesting feature of the peninsula is its population. The Arab is of medium stature, muscular make, and brown complexion. Independence looks out of his glowing eyes; by nature he is quick, sharp-witted,

imaginative, and passionately fond of poetry. Courage, temperance, hospitality, and good faith are his leading virtues; but these are often marred by a spirit of rapacity and sanguinary revenge. His wife or wives do the work, keep the house, and educate the children.

Arabian life is either *nomadic* or *settled*. The wandering tribes, or Bedouin, who have, however, their allotted winter and summer camping-grounds, and a strong attachment to their own mode of life, entertain notions of the rights of property differing seriously from those regulating the West; yet even their most marauding tribes are not without a traditional code of law and honour, the only law recognised among them; the enforcing of it is left to every tribesman. The settled tribes, styled Hadesi and Fellahs, are despised by the Bedouin, who scorn to intermarry even with the few artisans that accompany every tribe. The Bedouin are several times outnumbered by the settled population, and therefore must not be regarded as normal Arabs, who are adventurous, commercial, and willing to become sailors. Yet mountain and desert barriers and patriarchal anarchy make Arabia the 'anti-industrial centre of the world,' where passing centuries bring no improvements save such as are forced on it by foreigners. The export of coffee, dates, figs, spices, and drugs, though still considerable, is said to be only a shadow of the old commerce which existed before the circumnavigation of Africa. Arabia has few manufactures, but carries on a transit-trade in foreign fabrics, besides importing these to some extent for its own necessities. Education is mostly confined to that within the household, where, however, a boy is instructed in reading and writing, in grammar, history, and poetry, and where he is trained to habits of politeness and self-restraint. In the few higher public schools, writing, grammar, and rhetoric compose the whole curriculum. The government is patriarchal, and the chief men of the various tribes have the title of Emîr, Sheikh, or, in a religious sense, Imâm Their function appears limited to leading the troops in the time of war, to levying tribute, and to the administration of justice. A spirit of liberty in the people moderates the authority of their chieftains; but instances of extreme despotism have not been unfrequent both in early and modern times.

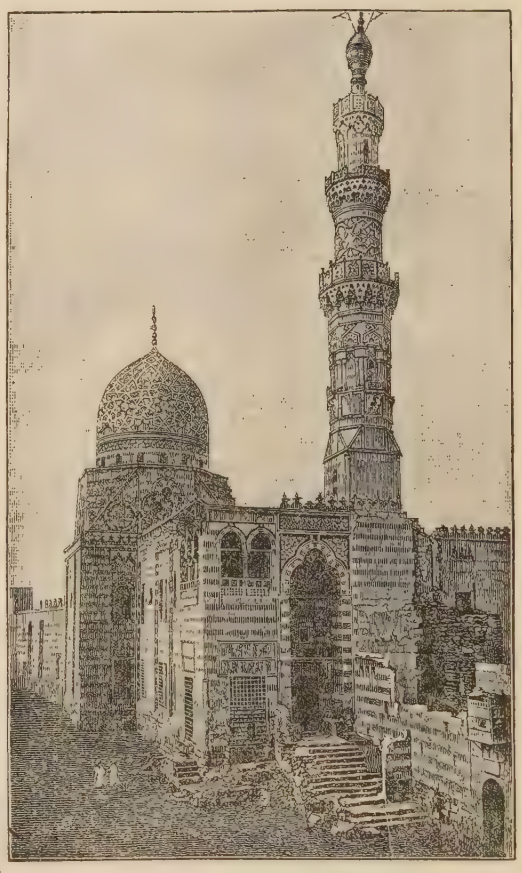
History.—The Arabs are of two main races. The one occupying the north half of the country is conveniently called the Ishmaelitic; the other, covering the southern half, is called the Yoktanic if we use the Hebrew word—the Kahtanic if we use their own—and is in Arabia regarded as the pure old Arab stock. The origin of the Kahtanites is probably African. In prehistoric times they issued from Yemen, the most highly civilised part of the peninsula, in powerful colonies to Omân and Central Arabia.

If blessed is the country that has no annals, peculiarly blessed was Arabia before Islam, for then 'the history of the Arabs was the songs of the bards.' In 24 B.C. Ælius Gallus, prefect of Egypt under Augustus, attacked Yemen unsuccessfully. Trajan appropriated some extreme northern parts bordering on the empire, but they were restored after his death. Persia, too, intruded over the nearest frontier. In the 4th century the Abyssinians invaded Yemen, not for the first time, and they long ruled it. Again, in 529, a large Abyssinian army subdued Yemen, and held their ground for 76 years. But Hedjâz, the Barrier, proved impenetrable against Persia, Egypt, Rome, and Byzantium. The Arabs lived then more after the manner of the Bedouins at the present time, in tents of hair or woollen cloth, following the pasture, exchanging sheep for what corn they needed; their wealth consisting in camels, sheep, horses, and slaves. Government was not, but sheikhs chosen from certain families led the camps. The usage of blood revenge, calling out the kin of the slain against the kin of the murderer, punished or prevented homicide, and thus precluded alike peace and extermination. Gambling and drunkenness were common. Polygamy, and the husband's absolute power of divorce, the common practice of burying female children alive, and many old proverbs, as 'The best son-in-law is the grave,' illustrate the position of woman. Arabs were incurably prone to pillage, passionately fond of freedom, proud of birth, hospitable, true to their word, true to their tribe or to a tribesman, right or wrong, against the world. Scarcely ever was any tribe at peace with all its neighbours. But one bond of union was the annual fair of Okâdh, near Taïf, a day's journey east from Mecca, which lasted all the pilgrimage month, and at which horse races, gymnastic sports, and poetic contests relieved the seriousness of trade. Mohammed, to prevent the feuds kindled by these contests, put an end to the fair. Another bond was the Káaba, the small rude temple of unknown antiquity at Mecca, wherein the tribal idols were collected. In Mohammed's youth, these numbered 365. Late in the 5th century the Koreish tribe became foremost at Mecca, and guardians of the Káaba. This post had ever been an object of rivalry and war among the tribes of both north and south, giving not only a religious pre-eminence over all Arabia, but the disposal of the offerings of gold, silver, or of other kinds, accumulated in the temple, a fund which was increased by commerce on the Red Sea coast. To religion, destined to play so decisive a part in Arabian history, Arab nature is not much addicted. Before Islam, the primitive Sabæanism was forgotten, or miserably degenerate; the tribal idols, stones, fetiches of simplest kinds, and jinn, were worshipped, and Allah, 'the God,' was vaguely acknowledged. But two monotheistic religions had cast roots among the tribes. Many Jews had immigrated into Arabia after the destruction of Jerusalem, and had made many proselytes, especially in Yemen, whither the Abyssinian conquerors had, in the 4th century, brought Christianity. In north Central Arabia this religion had found earlier access. In Mecca, Mohammed was born of the Koreish tribe in 571, the year of the Elephant, when the Abyssinians of Yemen had brought elephants to the unsuccessful siege of Mecca. Taught by the merits and shocked by the corruptions of those two religions, and by the lack of anything better, he, after a while, introduced by the sword his own doctrines, thus forming the grand epoch in Arabian history, and bringing Arabia into close connection with the general history of civilisation. His flight (Hegira) in July 622, on being driven from Mecca to Medîna, where he gathered his first body of adherents, forms the Moslem era. Now, for the first time, the people of Arabia became united under one sceptre and one creed, and powerful enough to erect new empires in the three quarters of the world: in Palestine, Mesopotamia, and Persia; in Egypt and the north of Africa; in Spain. The dominion of the Arabs, from the time of Mohammed to the fall of the khalifate of Baghdad in 1258, or even to the expulsion of the Moors from Spain in 1492, is an important period in the history of civilisation (see MOORS, KHALIF). But the movements that had such great effects on the destinies of other nations, left the peninsula itself in an exhausted and neglected condition. The monotonous darkness and storms of patriarchal anarchy are broken during the next

thousand years by few events of importance. The invasion of Abu Taher, leader of the Carmathian sect (died 950), from the Euphrates, left no remnant of the khalifate, and little of orthodox Islam. Arabia was broken up into independent principalities. The Turks subdued Yemen in the 16th century, and were expelled in the 17th. Omân in the 16th and 17th centuries was in Portuguese hands; the Dutch gained and lost many points; the Persians were driven out by Ahmed ibn Sa'ud in 1759, who thus became sultan of Omân. About 1760 Mohammed-ibn-Abd-il-Wahhâb, in Nejd, came forward as restorer of primitive Islam. The sword of his convert Sa'ud gave the Wahhâbis (q.v.) dominion from the frontiers of Mecca to the Persian Gulf. After his death Mecca and Medîna were soon added. The Wahhâbi empire was shattered (1812–18) by Mohammed Ali, viceroy of Egypt, but almost immediately restored itself. Omân, however, had regained independence under its native sultan. Shomer, to a considerable extent Christian, had, in the beginning of the 8th century, successfully resisted the Omayyad khalifs; had probably become nominally Moslem, then really heathen; was absorbed by the Wahhâbis, freed itself when they fell, but failed to resist them in 1921. Hasa also freed itself, but, after an obstinate resistance, was reconquered. Turkey occupied it in 1875, and made it part of the sanjak of Nejd. After Mohammèd Ali's short independence, Yemen and the Hedjâz were restored to Turkey by treaty in 1841. Indian interests in particular led to Britain's occupying Aden (1839) and other points on the coast. Turkish power, already weak, was overthrown by the war of 1914–19. The Emir of the Hedjâz proclaimed himself king in 1916, and, till the Wahhâbis of Nejd overran his country, his family seemed to divide with them the hope of welding the Arabs into a great united nation.

Authorities on Arabia are Pococke, Niebuhr, Burckhardt, Wallin, Burton, Welsted, Hurgronje, Halévy, Huber, Seetzen, Euting, Blunt, Doughty, Zwemer, Musil, Hogarth, Bury, Philby, Cheesman, Lawrence. See also MOHAMMED, HAJJ, MIDIANITES, MOORS, RED SEA, PERSIAN GULF, ADEN, MUSCAT; the articles referred to above; and those on other regions inhabited by Arabs (Mesopotamia, Palestine, Syria, and the countries of North Africa).—The Arabian Desert is in eastern Egypt.

Arabian Architecture dates from long after the time of Mohammed; the Arabs or Moslems were not a temple-building people, but through intercourse with western nations, desired to give their religion a visible embodiment, like the churches of the Christians. They had accordingly to engage architects and workmen from Byzantium; and their earliest mosques were thus erected in the style of the late empire, the dispositions of the buildings being adjusted to suit the requirements of their worship. By degrees, the court usually placed in front of the Christian church became enlarged and surrounded with arcades, while the church was diminished in size and importance, and was represented merely by a deeper arcade. Such are the early mosques of Cairo, erected during the first two centuries of the Hegira, between 622 and 900 A.D. It is noticeable that in these buildings the arches are all of the pointed form, which seems to have been of very ancient use in the East. This was afterwards modified into the horseshoe shape which is peculiarly characteristic of Saracenic art. Gradually a new and fanciful ornamentation known as Arabesque (q.v.) was added to the recognised features of Greek and Roman edifices. The exclusion of animal figures, which their abhorrence of the very appearance of idolatry necessitated, confined the Mohammedan artists to the imitation of vegetable productions, varied by geometrical patterns and inscriptions, of which the letters were woven into forms which suited them for architectural uses. At first Saracenic art partook largely of the



The Mosque of Kait Bey, Cairo.
(From a Photograph by Frith.)

styles of the countries into which the Mohammedan religion was introduced, but gradually a style more or less homogeneous was evolved, of which fine examples are found in Persia, India, Africa, and Spain, and of which the influence continues to the present day. In India, this style finds expression in the magnificent tombs of the Tatar rulers, with their wonderful domes and graceful minarets (see AGRA). The gateways are also features of great size, on which much ornament is usually displayed. In Spain, the Moors erected many important buildings, from the mosque of Córdoba, begun by Abd-el-Rahman in 786, which resembles those of Cairo in general idea, to the Alhambra at Granada, erected in the 14th century during the decadence of the Moorish rule. Many of these structures, although beautiful and elaborate in design, are unfortunately built with brick and stucco, and have yielded to the influence of time. The style of the Moors, after their expulsion from Spain, long continued to influence that of the Christians, especially in the southern part of that country.

Arabian Gulf. See RED SEA.

Arabian Language and Literature. Regarding the oldest literary culture of the Arabians, we possess but slight information. As far back as Solomon's time, the queen of Sheba (probably *Arabia Felix*) was noted for her skill

in enigmas. The nomadic tribes, living under the patriarchal rule of their sheikhs, possessed everything that was favourable to the growth of a simple and natural poetry. They had quick and vivid feelings, and a rich, glowing fancy, which, operating upon the perils, the hardships, and strange confederate life they led in those barren sand-deserts, and among naked rocks, could hardly fail to call forth a wild and vigorous minstrelsy. Before the time of Mohammed, the Arabians had celebrated poets who sang the feuds of tribes, and the praises of heroes and fair women. During the great fairs at Mecca and Okâdh, poetic contests were held before the people as at the Grecian games; and the poems to which the prize was awarded were re-written in golden characters, and suspended in or on the Káaba at Mecca, and are therefore termed *Moallakât*, 'suspended.' They are remarkable for their pathos, soaring conceptions, richness of imagery and phraseology, free and unconstrained spirit, and the glow of their love and hate. Among the famous poets of this early period are Nábegha and others, whose works were translated and published by De Sacy in his *Chrestomathie Arabe*, and Kaab-ben-Zohair, who lived to celebrate the praises of the prophet Mohammed.

But Arabian literature began a new career with Mohammed, though his Korân contains not one precept favourable to literature or science. During the first eighty years of their conquests, when they had extended their dominion from Egypt to India, and from Lisbon to Samarkand, nothing can be said of their culture and refinement. A fanatical desire of conquest prevailed. Gradually, however, the taste for elegant pleasures arose during the repose that followed conquest, and the conquerors served themselves heirs to the civilisation that was perishing around them. With the Abbaside khalifs, literature, science, and art arose (750 A.D.); when the khalifate fell (1258), they entered on their decline. They were generously fostered under the splendid sway, first of Almansor (754–75), and afterwards of the celebrated Haroun Al-Raschîd (Harûn Al-Rashîd, 786–808). Learned men were invited to their courts from many countries, and remunerated for their labours with princely munificence; the works of the best Greek, Syriac, and old Persian writers were translated into Arabic, and spread abroad in numerous copies. The Khalif Al-Mamûn, who reigned from 813 to 833, offered to the Greek emperor five tons of gold and a perpetual treaty of peace, on condition that the philosopher Leo should be allowed for a time to give him instruction. Under the sway of the same Al-Mamûn, excellent schools were founded in Baghdad, Basra, Bokhara, and Kufa; while large libraries were collected at Alexandria, Baghdad, and Cairo. In Spain, the high school of Córdoba rivalled the literary fame of Baghdad, and generally, in the 10th century, the Arabs appeared everywhere as the preservers and distributers of knowledge. For this period of Arab glory corresponds exactly to that of Europe's deepest darkness, when Italy had no philosopher but the French pope, Sylvester II. (died 1003), whose learning, obtained from the Arabs of Córdoba, earned him the name of necromancer. Pupils from France and other European countries then began to repair to Spain in great numbers, to study mathematics and medicine under the Arabs. There were fourteen academies, with many preparatory and upper schools in Spain, and five very considerable public libraries. When 300 volumes were a great library for a rich monastery, the library of the Khalif Hakem II. of Spain (died 977) contained, it is said, more than 600,000 volumes. This state of culture, when compared with that prevalent before Mohammed, shows a rapidity of progress in knowledge almost as remarkable as the career of Arabian conquest.

The Arabs despised the languages of Greece and Rome, abhorred their poets for their heathenism, and disliked their temperate dignity of style; but in science the Arabs were willing learners, and rendered important services. Arabic words still employed in science—such as algebra, alcohol, azimuth, zenith, nadir, with many names of stars, &c.—remain as indications of their influence on the early intellectual culture of Europe. But geography owes most to them during the middle ages. Conquest, widened political connection, trade and the duty of pilgrimage, impelled them to this study. The old Arab treatises on geography, and works of travels in several countries by Ibn Fodhlân (died 921), the fugitive African khalif, Edrisi (*circa* 1153), Ibn Jobair (died 1217), Abulfêda, prince of Hamath (died 1331), Ibn Batuta (died 1377), Albiruni the historian, and others, are still interesting and valuable.

Of what happened in the world before Islam, the Arabs cared to know nothing but the lives of the patriarchs and prophets, and a little of Persian history; but the history of the world after Islam arose was studiously cultivated. After the dawn of the 10th century, history became a favourite study of the Arabs. The first that attempted a universal survey of the subject were Masûdi (died 957), in his *Golden Meadows;* the Persian Tábari (died 923), whose annals, of great bulk and value, were published by De Goeje and others in Leyden in 1879–1901, and Eutychius, Christian patriarch of Alexandria (died 950). These were followed by Abulfáraj or Bar Hebræus, philosopher and also theologian, 'the phœnix of his age;' and George Elmakîn (flourished in Egypt in the 13th century), both Christians; Abulfêda; Nuvairi, who wrote a cyclopædia (*circa* 1331); Makrîzi, who wrote the history of Egypt (died 1441), and others. See Wüstenfeld's *Geschichtschreiber der Araber* (1882), and translations by Quatremère.

Arabian theology and jurisprudence are intimately connected, and both founded on the Korân; but are by no means so simple and uniform as is generally supposed. Speculation first began to prevail during the Ommiade dynasty, and the Aristotelian philosophy to be studied by the Arabs. As a consequence, the vague statements of the Korân were soon variously interpreted, and a host of sects gradually arose. Of these, four only are regarded as orthodox, leaving not less than seventy-two heretical, whose discordant tenets are stated in the work of Shahrestani (trans. by Cureton, London, 1842). The four orthodox sects arose in the 8th century, and are: the Hanîfites, who do not reject tradition, but subordinate it to reason; the Shâfiites, who entirely refuse the aids of reason and philosophy in their treatment of theology; the Kambalites and the Málechites, who allow speculation on points where there is no tradition. The collection of traditions known as the *Sunna* gives an account of the sayings and doings of Mohammed, and, though pedantic in its details, is in substance more valuable than the Korân. The interpretation of the Korân constitutes the principal part of education in theological jurisprudence. The most celebrated of the commentators are Zamákhshari, rationalistic, and Baidhâwi, orthodox. Consult Tornauw, *Das Moslemische Recht* (1885).

Arabian philosophy, which was of Greek origin, held the same relation to the Korân as the Scholasticism of the middle ages did to the Christian Scriptures—that is, it was regarded as the servant of faith. The chief study of the Arabs was the writings of Aristotle, who became known in Spain, and subsequently in all Western Europe, through

translations from Arabic into Latin; though the Arabs themselves only knew the Greek philosopher in translations made during the time of the Abbasides. Especial attention was paid to logic and metaphysics. The most distinguished of their philosophical writers are: the honoured leader, Alkindi of Basra, who flourished about the beginning of the 9th century; Alfarâbi, who wrote a work on First Principles in 954; Avicenna (died 1036), who combined the study of logic and metaphysics with that of medicine, and made considerable progress in chemistry, nosology, and medical botany; Alghazali (died in Baghdad, 1111); Abubekr-ibn-Tofail (died in Seville, 1190); and his pupil, Averroes, greatly esteemed as an expositor of Aristotle. See *Sur les Écoles Philosophiques chez les Arabes*, by Schmölders (Paris, 1842); Renan, *Averroès et l'Averroïsme* (1850); Horten, *Arabische Philosophie* (1922).

Many of these illustrious Arabian philosophers were also physicians. The science of medicine is essentially a creation of the Arabs, to whom the oldest sources of knowledge—that of the Indian physicians—had been early opened. Chemical pharmacy (see ALCHEMY) was created by the Arabs. Pharmacy and *materia medica* naturally led to botany and chemistry. For three centuries—from the 8th to the 11th—a rich scientific culture prevailed. Schools of philosophy and medicine sprang up at Jondisahur, Baghdad, Isfahan, Firuzabad, Bokhara, Kufa, Basra, Alexandria, Córdoba, &c. In all departments of medical science a great advance was made, except in anatomy (the Korân forbidding the dissection of human bodies). The most famous writers on medicine are Râzi (Rhazes) of Baghdad (*c.* 922); Alkindi; Avicenna (980–1037), who wrote the *Canon of Medicine*, for a long time the only handbook on the subject; Abulkasem of Córdoba (died 1107); and Averroes (1126–98), who wrote a complete system of medicine.

In mathematics, the Arabs made great advances by the introduction from India of the numerals and mode of notation now in use, of the sine instead of the chord in trigonometry (thanks to Albatâni), and of a more extended application of algebra. While alchemists, searching for the elixir of life and the philosopher's stone, were founding chemistry, astrologers were enriching astronomy, which was zealously studied in the famous schools and observatories of Baghdad and Córdoba. Alhazân wrote upon optics. The *Almagest* or System of Astronomy by Ptolemy was translated into Arabic as early as 812. In the 10th century, Albatâni, the greatest of Arabian astronomers, a Sabæan by religion, and born in Haran (died 929), observed the advance of the line of the apsides in the earth's orbit. Abul-Hassan-Ali wrote on astronomical instruments in the 13th century.

Besides these advances in the solid branches of knowledge, the genius of the Arabs continually flowered into poetry. Numerous poets sprang up in all lands where the children of the desert had carried their irresistible faith. Their verse, however, was not like the rude, simple minstrelsy of a purely patriarchal people; it gradually allied itself to the prevailing culture, and took, especially in the golden epoch of Arabian civilisation, a highly artistic form. None have been more highly esteemed than Motanebbi (killed 965) and Abu-Temâm (died 845), who compiled the old poems that compose the Hamâsah. Famous, too, are the satirist Abul-Olá (died 1057), the Egyptian Busîri, whose *Bordah* is a eulogy of Mohammed, and two Syrians, El-Rûmi (died 896) and the profound Ibn Fârid (died 1235; his *Diwân* was published at Beirût, 1874). Hamadâni (died 1007) introduced novels in rhyming prose like that of the Korân, and wrote four hundred of them under the name of *Maqâmât*. Harîri (died 1121) brought this form of literature to perfection. Azzeddîn (died 1279) wrote an ingenious allegorical poem, 'The Birds and the Flowers.' Besides these, a singularly wild and fantastic prose literature made its appearance, in which the craving for the wonderful and gorgeous, so characteristic of the restless, adventurous Arabs, was richly gratified. Romances and legendary tales abounded. The most famous of these are: *The Arabian Nights' Entertainments* (q.v.), *The Exploits of Antar* (pub. Buiâq, 1869), *The Exploits of the Champions*, and *The Exploits of Bibârs*. The taste for proverbs, fables, and biography was extensively indulged. In fact, with the exception of the drama, condemned by the Prophet, there was no sort of literature that the Arabs did not attempt. The trouvères of Northern France, the troubadours of Provence, the inspirers of Italy, and the romancers of medieval Europe owed much to the Arabs, whose influence on modern literature still endures. The tales of fays, charms, sorceries, and the whole gorgeous machinery of enchantment, passed into the poetry of the West. During the middle ages of European history, several of the most popular and widely-spread books came from or through the Arabs; such as *The Seven Wise Masters*, and *The Fables of Bidpai* (q.v.), though the Arabians themselves borrowed largely from Persian stories and Greek fables. See Clouston's *Arabic Poetry for English Readers* (1881); Nicholson's *Literary History of the Arabs* (1907: new ed. 1923).

All this culture of the early ages of Mohammedanism presents a strong contrast to the ignorance which now prevails among the Arabs. The brutal fanaticism of the Turks nipped the blooming promise of the East; sunk in stupid indolence, the peoples await in apathetic resignation their deliverance and return to higher modes of life. Literature furnishes now nothing worthy of notice. Learning spends itself principally in commentaries and scholia, in scholastic discussions on the subject-matter of dogmatics and jurisprudence, and in tedious grammatical disquisitions concerning the old Arabic speech, generally acute and subtle, but always unprofitable and unenlivening. The swift and mobile genius of the East has departed, and pedantic dullness has usurped its place. There are 'Dryasdusts' even in the desert. A few modern writers have attempted, with more or less success, to imitate European forms of thought and sentiment. Of these may be mentioned Michael Sabbagh of Syria; the Sheikh Refaa of Cairo; Nasîf-Effendi of Beirût, who wrote the critical observations in De Sacy's edition of Harîri (*Epistola Critica*, Leip. 1848); B. Bistâni in his cyclopædia (Beirût, 1875).

Arabic also possesses a Christian and Jewish literature, which, however, is chiefly ecclesiastical. Its principal ornaments are Eutychius, Elmakîn, and Abulfáraj. Translations of the Old Testament were made, not from the Hebrew, but from the Septuagint, or from Latin versions. In the middle ages, the Spanish Jews employed Arabic for their learned compositions; and several of the most important works of Moses Maimonides, for example, were originally written in that tongue. Consult on Arabian literature, D'Herbelot's *Bibliothèque Orientale;* Kremer's *Kulturgeschichte des Orients* (1875–7); Zenker's *Bibliotheca Orientalis* (1846–61); and Ibn Ishâq's *Kitâb-al-Fihrist*, the oldest Arab cyclopædia of literature, of about 1000 A.D., published by Flügel (2 vols. Leip. 1871–2).

The Arabic *language*, it has been remarked, is at once both *rich* and *poor*. It is necessarily destitute of innumerable words describing those ideas and objects which only civilisation can develop or produce; but, on the other hand, the rich and nimble fancy of the Arabians has multi-

plied, to an almost incredible extent, the synonyms of their desert-tongue, so that in some cases hundreds of expressions are found for the same thing. The Arabic belongs to the so-called Semitic family of languages, among which it is distinguished for its antiquity and soft flexible grace. Through the Korân, the dialect of an Ishmaelitic tribe, the Koreish, became the predominant language of literature and commerce throughout the whole extent of the Arabian dominions. The Himyaritic from Abyssinia, and closely akin to the ancient Ethiopic, is known as yet only by a few inscriptions, &c. Arab poems till 750 consisted mostly of from two to one hundred and twenty lines of one rhyme. Thereafter was developed an exact and complex prosody. Al-Jauhari, who died in 1009 A.D., drew up a dictionary of the pure Arabic speech, which he entitled *Al-Sihah* ('Purity'), and which is held in high estimation to this day. Mohammed-ben-Yakûb-al-Firuzabâdi, who died in 1414, was the author of an Arabic Thesaurus, entitled *Al-Kâmûs* ('The Ocean'), which is the best lexicon in the language, and has consequently been translated into Persian and Turkish. Jordshani has explained, in alphabetical order, the meaning of the technical terms used in Arabic art and science. His work was published by Flügel (Leip. 1845), under the title of *Definitiones*. Meidâni made a large collection of Arabic 'saws,' apophthegms, &c., which was published by Freytag (Bonn, 1838). Through the conquests of the Arabs in Sicily and Spain, their language became known in Europe; but notwithstanding the numerous traces of its influence in various European tongues, it became forgotten after the expulsion of the Moors from Spain. The first European scholars who earnestly took up the subject were the Dutch, in the 17th century; after them, the Germans, French, and English. The more learned theological students consider it a necessary part of their education. Maltese is an Arabic dialect, akin to the Mozarabic of the Spanish Moors. In Turkish plainly, and even in Malay, the traces of Arabic appear. In Persian every fourth, and in Hindustani every fifth word is Arabic. In recent times the purely negro population of the central and western Sudân have, in receiving Islam, made considerable progress in civilisation and the knowledge of Arabic. The Arabic language is never printed but in the ancient classical form, of which the Korân is regarded as the unapproachable standard. Classical Arabic is spoken in northern Central Arabia, differences increasing with distance. Elsewhere the language has lost, as Hebrew had lost before the oldest books of the Bible were written, the final vowels distinctive of case in nouns, and person in verbs. Egyptian or Syrian Arabic is less pure than the native, but more pure than the Arabic spoken from Tripoli to Morocco. Wright's *Arabic Grammar* (new edition) is one of the best extant; Lane's *Arabic-English Lexicon* is a standard work; and Badger's *English-Arabic Lexicon* (1881) is also excellent. The grammatical and lexicographical works of Caspari, Freytag, Fleischer, and De Sacy, are most important. See SEMITES.

Arabic Writing.—Like all Semitic writing, this proceeds from right to left. It is borrowed from the old Syriac, and was probably introduced into Arabia by Christian missionaries about the time of Mohammed. In its oldest form it is called Kufic, from the town of Kufa, on the Euphrates, where the transcription of the Korân was busily carried on. Its characters are rude and coarse, and it has particular symbols for only sixteen of the twenty-eight Arabic consonants. This writing, nevertheless, continued to be employed for 300 years, and for coins and inscriptions even later; but in the 10th century it was displaced for common purposes by a current handwriting, the *Neskhi*, introduced by Ibn Mokla. This is the character still in use, more or less modified, by all nations that have adopted the Mohammedan religion. In it, the consonants which resemble each other are distinguished by points, and the vowels by strokes over and under the line; but in writing and printing, the vowels are commonly omitted.

The following passage, the translation of John iii. 16 as published by the British and Foreign Bible Society, will show the character (see also ALPHABET). It may be thus transliterated:

Liannahu hakatha ahabb Allah el'alam hatta bathal ibnahu elwahid lkai la yahlik kull man yu'min bihi bal takun lahu elhayyat elabadiyat.

لانهُ هكذا احبَّ اللّٰه العالم حتى بذل ابنهُ
الوحيد لكي لا يهلك كُلّ من يومن بهِ بل تكون
لهُ الحيوة الابديَّة.

Arabian Nights' Entertainments (*Alf Laylah wa Laylah*, 'A Thousand Nights and a Night'), in Christian lands, the best known product of Arabian literature. The name and plan of this work are very ancient. Masûdi in his famous history, *Golden Meadows*, written in 943, mentions the Persian Hezâr Afsâne, translated into Arabic with the name *A Thousand Nights and a Night*. Mohammed-ibn-Ishâq, in his work *Al Fihrist*, written in 987, mentions the Persian work as well known to him, and as containing about two hundred tales divided into a thousand nights. He thus relates its origin. A Persian king used to marry a new bride every day, and put her to death next morning. One wife was Shahrazâd (Scheherazade), who had understanding and discretion. As they sat together she began a tale, and late at night she broke it off at such an interesting point that the king next morning spared her life, and at night begged her to continue her tale. So she did a thousand nights. Meantime she bore him a child. Presenting the child to him, she told him of the craft she had used; and the king, whose love she had now gained, admired her policy and let her live. Mohammed adds that the book was written for the Princess Homai, daughter of Bahman Artaxerxes, and that it had been translated into Arabic with alterations, some new tales being substituted for old.

The much-befabled Princess Homai is half mythical, like the Babylonian Semiramis, an accredited doer of many things whose author is unknown. Masûdi tells that her mother was a Jewess whom Bahman had married, and who delivered her people from bondage: in short, she was the Esther of Israelitish tradition. But Persian poets and Arabian historians do not make it clear whether the name Shahrazâd belonged to the mother or the daughter. Tábari calls Esther the mother of Bahman Artaxerxes (Longimanus); this is implied in the biblical story, as Ahasuerus seems to be Hebrew for Xerxes.

The occasion of the book written for the Princess Homai resembles the story told in the Hebrew Bible about Esther, her mother or grandmother, by some Persian Jew two or three centuries B.C. The likeness is closer between the biblical story and that of Shahrazâd as it appears in the Arabian Nights, the surviving representative of the Persian *Thousand and One Nights*. In both, the Persian

king is offended with his queen; from the Persian book we cannot tell why; in the Hebrew, because she has insulted him at a banquet before his princes and lords; in the Arabian, for a fouler reason. In all three, thereafter, the king has a new wife daily. The Persian and the Arabic consign her next morning to death; the Hebrew merely to the seclusion of the harem. All three tell that the king at length honoured as queen the one that gained his lasting love; the Arabic makes her the grand-vizier's daughter; the Hebrew, the vizier's foster-daughter. The Persian ascribes to her her people's deliverance from bondage; the Hebrew, their salvation from massacre; the Arabic originates her hardy resolution to marry the bloodthirsty king in her zeal to save the daughters of her people. In all three the king is charmed at night with recitals from the past. In the Persian story she is aided by the king's housekeeper, in the Arabian by her own sister, in the Hebrew by the king's chamberlain.

A quotation by Makrîzi from Ibn Saîd of about 1250, mentions the *Thousand and One Nights* as a romantic work. Meantime the work seems to have, in the course of centuries, had the experience of a celebrated pair of hose which lost their identity by universal patching, and to have been edited into its present form about 1450 in Egypt, and most probably in Cairo. How much of the Princess Homai's book remains in it we cannot tell, nor where to look for this remainder. The Persian origin of some of the tales is evident; equally evident the Indian origin of others, notwithstanding the location in Bagdad, and the presence of the Khalîf Haroun Al-Raschîd. But in a great part of the work both form and matter appear to be Arabian. The foundation of many tales in history or legend or older tales limits their age. The story of the city whose inhabitants are turned into fishes, the Christians into blue, the Magians into red, the Jews into yellow, the Moslems into white, cannot well be older than the year 1301, when the sultan of Egypt, to distinguish true believers from infidels, ordered Christians to wear blue turbans, and Jews yellow, while white turbans were reserved for Moslems alone. The story told by the purveyor of the sultan of Kashgar is taken, and considerably spoiled in the taking, from the Chronicle of Ibn-Al-Jauzi, who died in 1200. It is the story of Qamar, slave of the princess mother of Al Moqtadir, who was Khalîf from 910 to 932. Others are traced by Lane.

The *Thousand and One Nights* has never been patronised or protected by the literary classes of the East. The puritanical spirit of high Mohammedan literature demands an apology from any merely entertaining author for not better employing his time. The *Thousand and One Nights* accordingly bears the penalty of being neither religious nor scientific. Its style is mean; it has been much handed about in fragments among the comparatively uneducated; told by professional story-tellers so as to suit the rough audiences of Eastern towns; and copied from such men's dictation, individual taste or fancy filling many a blank.

Various editions differ considerably in the telling and order of the stories. The best are the not well-printed Bulâq edition, the very similar but well-printed Calcutta edition of 1839, and the Breslau edition. No MS. appears to be older than 1548, the date of that used by Antoine Galland. His French translation, published in Paris, 1704–8, in 12 vols., was long supposed to be the fruit of his own imagination. It much misrepresents his original, and the Eastern life. Rendered into English, it became the most popular form of the *Thousand and One Nights* in Britain. He inserted into it ten tales of unknown origin; but in 1887 Burton found the Arabic text of two of these (including Aladdin) in a Parisian library. In 1840 E. W. Lane, prepared by several years spent in Cairo entirely among Arabs in the Arabian manner, published his scholarly translation, which spares us the coarseness of the original and much of its wearisome length. His notes are admirable. Payne's complete translation was published for subscribers in 9 vols. 1882–84, and, according to Wright, Burton's biographer, was freely drawn on in Sir Richard Burton's translation, printed for subscribers in 10 vols. (1000 copies, at 'Benares,' 1885–87, with elaborate notes, excursuses, and six volumes of supplement). The notes reveal extraordinary insight into Arabian life in its most fascinating and most revolting aspects. Lady Burton's edition of her husband's work, 'prepared for household reading' by J. H. M'Carthy, omits only 215 out of 3215 pages (6 vols. 1888). E. P. Mathers (16 vols. 1923 *et seq.*) follows Dr Mardrus's French translation (1899 *et seq.*).

Arabian Numerals or CIPHERS—the characters 0, 1, 2, 3, 4, 5, 6, 7, 8, 9. Properly, they should be styled Hindu or Indian Numerals, for the Arabs borrowed them, along with the decimal system of notation, from the Hindus, probably in 773 A.D. Gerbert (afterwards Sylvester II.) seems to have learned the use of them from the Moors in Spain about the year 970. Yet their employment was not general before the invention of printing. Accounts continued to be kept in Roman numerals up to the 16th century. See NUMERALS.

Arabian Sea, the *Mare Erythræum* ('Red Sea') of the ancients (though the term appears to have been applied vaguely), is that part of the Indian Ocean which lies between India and Arabia. Its most natural limit on the south is a line from Cape Comorin to Cape Guardafui. Its two great arms are the Red Sea proper and the Persian Gulf.

Ar'abin is the essential principle of gum-arabic, and is obtained pure by adding alcohol to a solution of gum-arabic in water, when the arabin is precipitated in white flocculi. See GUM.

Ara'bi Pasha (1841–1911) was born in Lower Egypt of Fellah stock, served in the Egyptian army, and under Tewfik rose to be minister of war, in which capacity he virtually set aside the Anglo-French control. Britain intervened, and Arabi, leader of the insurrectionary party, was defeated at Tel-el-Kebir (1882), and was exiled to Ceylon, whence he was permitted to return in 1901. Lord Cromer maintains Sir Auckland Colvin's opinion that Arabi's was not a merely military revolt, but a genuine Egyptian uprising against Turkish misgovernment. See EGYPT.

Arabis, a genus of small cruciferous plants, generally white-flowered. Five species (rock-cress, wall-cress) are British; others are grown in rockeries.

Arabistan (anc. *Susiana*), a border province of Persia, formerly called Khuzistan, at the head of the Persian Gulf. The north-east is very hilly; the south-west is so level as to be almost a stagnant sea in the rainy season, and an arid waste in summer. Arabistan contains extensive pastoral districts, and exports wheat, opium, and oil; also tobacco, wool, gums, dates, and almonds. Under the rule of the khalifs of Bagdad it was one of the richest provinces, and Ahwáz, the capital, acquired world-wide reputation for its sugar, carpets, and silks. The seat of the governor is Shuster (pop. 10,000); the port is Mohammerah; other towns are Dizful, Ahwáz, and Abadan. Of late Arabistan has assumed fresh importance through the reopening of navigation on the Karun (q.v.) and the development of the Anglo-Persian Company's oil-fields and works which supply the British Admiralty.

Arabkir. See ARABGIR.

Aracajú, a port of Brazil, capital of the state of Sergipe, on the Cotindiba, 6 miles from the sea, exports cotton and coffee; pop. 45,000.

Aracan. See ARAKAN.

Aracari, a genus of birds closely allied to the Toucans. See TOUCAN.

Ara'ceæ. See ARUM.

Arachis. See GROUND-NUT.

Arach'nida (Gr. *arachnē*, 'a spider'), a class of Arthropod animals, established by Lamarck for spiders, scorpions, and mites. These are still regarded as forming an important contingent of the class—namely, the orders Araneæ, Scorpionidea, and Acarina; but to these must be added the whip-scorpions or Pedipalpi, the harvest-men or Opiliones, the book-scorpions or Pseudoscorpionidea, and other orders. At a greater distance come the King-crabs (Xiphosura) and the extinct Eurypterids, at a still greater distance the extinct Trilobites, and many would also include in this heterogeneous class the strange nobody-crabs or sea-spiders (Pycnogonids).

The class does not form a very coherent unity, and a statement of general characters is consequently very difficult. In most cases there are two pairs of mouth-parts (cheliceræ and pedipalps), four pairs of walking legs, no antennæ, a fusion of head and thorax into a cephalothorax, an abdomen without appendages, simple eyes, a curious internal skeleton called the endosternite, and not much in the way of metamorphosis. See *The Cambridge Natural History*, vol. iv.

Arachnoid Membrane, one of the three coverings which envelop the brain and the spinal cord, is situate between the dura-mater and the pia-mater; see BRAIN.

Arad, formerly capital of a district in Eastern Hungary, since 1920 part of Rumania, is situated on the right bank of the Maros, an affluent of the Theiss, and has a population of about 75,000, including many Jews. It is an important railway centre, and is 95 miles SE. of Budapest, and 74 miles E. of Szegedin by rail. It carries on a large trade in corn, spirits, wine, and tobacco, and is a great cattle-market. During the 17th century it was often captured, and at last destroyed by the Turks. During the revolutionary war of 1849 it was occupied for a time by the Austrians, who capitulated to the Hungarians in July. In August Arad was surrendered to the Russians by Görgei; many of the prisoners were massacred; and in October thirteen Hungarian officers were executed here by order of the infamous Haynau.—NEW ARAD, on the other side of the river, has 6000 inhabitants, including many Germans.—The county of Arad had an area of 2490 sq. m., with a pop. of about 500,000. It borders on Transylvania, and produces much excellent wine; the inhabitants are chiefly Rumanian in race, and most of it was assigned to Rumania in 1920.

Araeom'eter. See AREOMETER.

Araf, the purgatory of Islam, the place between Paradise and hell. Its position has not been defined with the usual exactness of Mohammed, but it is undoubtedly a place of purification by fire.

Ar'afat, MOUNT, *Orphat* or *Jebel-er-'rahme* ('mountain of mercy'), is a granite hill about 15 miles SE. of Mecca, visited by the faithful, and believed to be the spot where Adam, conducted by the angel Gabriel, met again his wife Eve, after a punitive separation of 200 years, on account of their disobedience in Paradise. It is not above 260 feet high, but its circuit is a mile and a half.

Ar'ago, FRANÇOIS JEAN DOMINIQUE, a celebrated French astronomer and physicist, was born February 26, 1786, at Estagel near Perpignan, in the department of Pyrénées Orientales. At the early age of seventeen, he entered the Polytechnic School at Paris, and in 1804 became secretary to the Observatory. Two years afterwards he was engaged, with Biot, by the French government, to carry out the measurement of an arc of the meridian, which had been commenced by Delambre and Méchain. Arago and Biot had to extend it from Barcelona to the Balearic Isles. The two savants established themselves on the summit of Mount Galatza, one of the highest of the Eastern Pyrenees, and here they lived for many months. War broke out betwixt France and Spain, and Arago was held to be a spy; his signals, supposed to be meant to guide the French invading army, were interrupted; and with great difficulty he succeeded in reaching Majorca. Having gone to Algiers, he was captured, on his way back to France, by a Spanish cruiser; and it was not till June 1809 that he finally arrived at Marseilles. As a reward for his sufferings in the cause of science, he was elected a member of the Academy of Sciences, though only twenty-three years of age, and was appointed professor of Analytical Geometry in the Polytechnic School.

His laurels were, however, won mainly in the fields of astronomy, magnetism, and optics. In 1812 he commenced his extraordinary course of lectures on astronomy and cognate subjects, which fascinated all Paris. In 1816, along with Gay Lussac, he established the *Annales de Chimie et de Physique*, and confirmed the truth of the undulatory theory of light. In 1818 he published his *Recueil d'Observations Géodésiques, Astronomiques, et Physiques*, and, with Biot, made geodetic observations on the coasts of England and Scotland. In 1820 he made several important discoveries in electro-magnetism—especially the phenomenon of *rotatory magnetism*. He may be said to have proved the relation between the aurora borealis and magnetic variations. He greatly promoted the acceptance of the undulatory theory of light, and made important advances in the doctrine of the polarisation of light. Other minor achievements were made in the department of photometric measurements of the brightness of the stars, the elastic force of steam and other gases. In 1830 he became chief director of the observatory, and received the post of Perpetual Secretary of the Academy. It was while holding the latter office that he wrote his famous *éloges* of deceased members. He took a prominent part in the July revolution (1830). Elected by Perpignan as member of the Chamber of Deputies, he occupied a position on the extreme left. In the revolution of 1848, he was chosen a member of the provisional government, and in this position he resisted the proposed measures of the Socialist party. Arago opposed Louis Napoleon, and after the *coup d'état* refused to take the oath of allegiance in 1852. He died 3d October 1853, and was honoured with a public funeral. His works were edited by Barral (17 vols. 1854–62), including the *Astronomie Populaire* and the *Notices Biographiques*. See Audiganne's *Arago, son Génie et son Influence* (2d ed. 1869).

JACQUES ÉTIENNE VICTOR ARAGO, brother of the great savant, was born 10th March 1790. In 1817 he accompanied an expedition round the world. Afterwards, we find him first at Bordeaux, and then at Toulouse, writing vaudevilles, besides publishing poems and romances. From 1835 to 1837 he managed the theatre at Rouen. His *Promenade autour du Monde* (1822), and *Souvenir d'un Aveugle* (1838), are well known. In 1849, though blind, he formed a company of speculators, and departed for California, to search for gold.

On his return he published *Une Vie Agitée* (1853). He died in Brazil in January 1855.—ÉTIENNE, another brother of the astronomer, was born 9th February 1802, and made himself well known as a popular author. He held an appointment under the provisional government of 1848, and was afterwards exiled. In 1859 he returned to France, and in 1878 became archivist in the *École des Beaux Arts*. He died 5th March 1892.—EMANUEL, son of the astronomer (1812–96), became known as a zealous republican in 1848, and was after 1852 active as a barrister. In 1870 he became a member of the committee of national defence, and afterwards held appointments under the government.

Ar'agon, once a kingdom, now divided into the three provinces of Saragossa, Huesca, and Teruel, in the NE. of Spain. Greatest length from north to south, 190 miles; breadth, 130. Area, 18,000 sq. m. Population, 1,000,000. It is bounded on the north by the Pyrenees, and borders on Navarre, the Castiles, Valencia, and Catalonia. The Ebro flows through Aragon in a south-easterly direction, receiving numerous tributaries both from the lofty regions of the Pyrenees and from the Sierras in the south. The province is naturally divided into the level country along the Ebro, and the northern mountainous district of Upper Aragon. The central plain is sterile, poorly supplied with water, and intersected by deep ravines. The valleys of Upper Aragon are at once the most beautiful and fertile of all the Pyrenean valleys. The Spanish Pyrenees, which attain a height of over 11,000 feet, are rich in grand scenery, and afford good sport for the angler and sportsman. The slopes of the hills are clothed with forests of oak, beech, and pine. The minerals of the province are copper, lead, iron, salt, alum, saltpetre, coal, and amber. The silkworm industry has been introduced. Aragon is peopled by a brave, active, enduring, obstinate race, high-spirited and patriotic, making good soldiers or audacious robbers. It early became a Roman province; and, on the fall of the empire, passed into the hands of the West Goths, but was conquered by the Moors in the beginning of the 8th century. The rulers of Aragon, after it had been recovered from the Moors and united with Catalonia (1137), became powerful; obtained possession of the Balearic Isles in 1213, of Sicily in 1282, of Sardinia in 1326, and of Naples in 1440. By the marriage of Ferdinand of Aragon with Isabella, heiress of Castile, in 1469, the two states of Aragon and Castile were united, and formed the foundation of the great Spanish monarchy. After Ferdinand's death in 1516, the union of the states was made permanent. The constitutional history of Aragon is peculiarly interesting for the stout defence of popular rights maintained by its cortes; even after the union with Castile, the old privileges were maintained. In the war with the French, 1808–9, Saragossa, the capital of Aragon, was remarkable for its heroic defence under Palafox. The chief towns are Saragossa, Calatayud, Huesca, and Teruel.

Arago'na, a town of Sicily, 6 miles NNE. of Girgenti by rail, with the old castle of the princes of Aragona. Near it are important sulphur-mines. Population, 14,000.

Ar'agonite, a mineral essentially consisting of carbonate of lime, and so agreeing in chemical composition with calcareous spar, but differing from it in the form of its crystals, of which the primary form is a rhombic prism with angles of 116° 16′ and 63° 44′, the secondary forms being generally prismatic and pyramidal. The effect of heat on them shows another difference, aragonite being reduced to powder by a heat in which calcareous spar will remain unchanged. Aragonite appears to be the product of a crystallisation taking place at a higher temperature than that in which calcareous spar is produced; and accordingly it is frequent in volcanic districts and in the neighbourhood of hot springs, as at Carlsbad. It is frequently found filling cavities (see AMYGDALOID), and lining cracks, joints, and other natural fissures in such igneous rocks as basalt and its varieties, porphyrite, &c. as in Scotland. It derives its name from the province of Aragon in Spain. It sometimes occurs in stalactitic form. Its crystals are sometimes prisms shortened into tables, sometimes they are lengthened into needles. Twin crystals (*macles*) are very common. *Satin spar* is a variety of it, in which the crystals are of a fine fibrous silky appearance, and combined together into a compact mass. *Flos ferri* (i.e. flower of iron) is a name given to a coralloidal variety which sometimes occurs in iron mines.

Araguay', a large river of Brazil, rising in the Sierra Sciada, and flowing 1000 miles northward, till, at San Joao, it joins the Tocantins, which again, after a northerly course of 300 miles more, mingles its estuary with that of the Amazon round the Isle of Marajo.

Ar'akan (*Arakan;* also spelt *Aracan* and *Arracan*), long the most northerly division of Lower Burma, is a narrow strip of territory on the Bay of Bengal, between Pegu and Chittagong in Lower Bengal. Its length is about 400 miles, while its breadth varies from 90 miles in the north to about 15. The area is 14,807 sq. m. A range of mountains, nearly parallel with the line of coast, the highest point 7000 feet above the sea-level, separates Arakan from Pegu and Upper Burma. The soil of the northern portion of Arakan is alluvial; but the country is hilly, difficult of access, and covered with forest. Railway connection with Assam is projected. The division consists of four districts—Akyab, Sandoway, Kyaukpyu, and the Hill District of Arakan. At its annexation in 1826 the population was only about 100,000; in 1839 it had increased to 248,000; in 1872, 483,363; in 1881, 587,518; in 1891, 671,899; in 1901, 760,848; in 1911, 838,896; in 1921, 909,246. Trade has steadily developed. Rice is the chief article of exportation; the others are cotton, tobacco, sugar, hemp, indigo, betel-nuts, and timber, especially teak. The imports consist mainly of British manufactures.

The native princes of Arakan, whose history is traced back to the 8th century, once ruled over a much wider area. The old capital, Arakan, now called Myo-haung ('old town'), is situated 50 miles from the sea, in a very unhealthy district. It was the capital of a kingdom for 350 years, and its massive ruins of forts and walls still point to its former greatness. But its population has dwindled to less than 3000 souls. The modern capital of the province is Akyab (q.v.). The Arakanese belong to the Burman stock, and are Buddhists, though there are a few immigrant Mohammedans.

A'ral, LAKE, in Central Asia, is separated by the plateau of Ust-Urt from the Caspian Sea. The largest lake in the steppes of Asia, it lies between 43° 28′ and 46° 52′ N. lat., 58° 10′ and 61° E. long., and has a surface area of nearly 25,000 sq. m. It is fed by the Sir-Darya (the ancient Jaxartes) on the NE. side, and the Amu-Darya (or ancient Oxus) on the SE. It has no outlet, and is generally shallow, the mean depth being 53 feet. On the west coast it reaches a depth of 223 feet; but it shoals gradually eastward to a mere marshy swamp. Its level varies (160 feet above sea-level and 250 above the Caspian in 1900). It is brackish, but, as its waters rise, its salinity (about 1 per cent. in 1900) is decreasing. Fish, including sturgeon,

carp, and herring, are abundant. The lake is dotted with islands. Its shallowness and exposure to fierce, sudden storms from the NE. render navigation (which dates only from 1847) difficult. The Orenburg-Tashkand railway passes its northern end. Its history and geography present many problems. It has been argued that within historical times the lake has more than once dried up, the Jaxartes and Oxus then emptying themselves into the Caspian. In 1717 Peter the Great sent an ill-fated expedition to try to divert the Oxus towards the Uzboi depression (its supposed old bed) and the Caspian, a project long entertained in Russia. L. S. Berg, as the result of investigations, 1899–1906, concluded that the Aral Sea was at one time united with the Sary Kamich lake to the south; that it communicated with the Caspian by the Uzboi depression; that under certain weather conditions the Oxus may branch off to the Caspian, as may have happened in the 13th–16th centuries; and that if the Aral rose 13 feet above its level of 1900, it would overflow towards the Caspian. Considerable differences in level have been recorded in recent times (1785–25—fall; 1835–50—rise; 1860–80—fall; since 1885—rise). Unlike the Caspian, it did not begin to fall after 1896. It was 4 feet higher in 1900 than in 1874.

Aralia. See ARALIACEÆ, GINSENG.

Aralia'ceæ, a family of plants allied to the Umbelliferæ, but less developed in inflorescence, which is often racemose-umbellate, and in fruit, which has usually more than two carpels, and is often succulent—witness the berries of the common ivy. The Araliaceæ are natives of tropical, temperate and cold climates, generally possessing stimulant and aromatic properties. Poisonous qualities are not developed as in the Umbelliferæ. The herbage of many species affords good food for cattle, and some are used for human food. The genus Aralia contains a considerable number of species—trees, shrubs, and herbaceous plants. *A. nudicaulis* is sometimes substituted in the United States for sarsaparilla; and *A. racemosa*, *A. spinosa*, and *A. hispida*, all natives of North America, produce an aromatic gum resin. *A. spinosa* is a diaphoretic stimulant. The berries, infused in wine or spirits, were employed in America as a cure for rheumatism. It is sometimes called Toothache-tree: it also bears the name of Angelica-tree. It is a native of moist woods in Virginia and Carolina, growing to a height of 10 or 12 feet, with a single stem, spreading head, doubly and trebly pinnate leaves and ovate leaflets, and is very ornamental in a lawn. *Stilbocarpa* (or *Aralia*) *polaris*, found in the southern island of New Zealand, described by Hooker as a very magnificent plant, is a herbaceous perennial, 4 to 5 feet high, with large orbicular masses of green foliage and waxy flowers, presenting a very striking appearance. *A. cordata* is employed in China as a sudorific. Its shoots are very delicate and pleasant when boiled; and the roots, which have an agreeable aromatic flavour, are used by the Japanese as carrots or parsnips are in Europe. Aralias abound in the warm valleys of the Himalaya. The natives collect the leaves of many as fodder for cattle, for which purpose they are of great value in a country where grass for pasture is scarce; but the use of this food gives a peculiar taste to the butter. Ginseng (q.v.), the root of a species of Panax or Aralia, is one of the most important products of the family Araliaceæ. Chinese rice-paper is cut from cylinders of the pith of an araliaceous tree of Formosa, *Fatsia* (or *Aralia*) *papyrifera*. But it is upon their remarkable value as decorative plants that the interest and cultivation of the group increasingly depends. The only representative of this family in the British flora is the Ivy (q.v.).

Aram, EUGENE, was born in 1704 at Ramsgill, in Yorkshire. Though but the son of a poor gardener he contrived to acquire considerable learning, married early, and became a schoolmaster, first in Nidderdale, and afterwards at Knaresborough, where he became intimate with one Daniel Clarke, a shoemaker. The sudden disappearance of the latter in 1745, at a time when he happened to be in temporary possession of a quantity of valuable goods, threw suspicion upon Aram, not as Clarke's murderer, but as his confederate in swindling the public. His garden was searched, and in it was found a portion of the missing property. Aram was arrested and tried, but acquitted for want of evidence. He now left his wife at Knaresborough, acted as a schoolmaster at various places in England, acquiring, in spite of his nomadic mode of life, a knowledge of botany, heraldry, Chaldee, Arabic, Welsh, and Irish. He had already amassed considerable materials for a Comparative Lexicon of the English, Latin, Greek, Hebrew, and Celtic languages. His secret was betrayed by a confederate, who excited suspicion by the loudness of his protestations that a certain skeleton that had been found near Knaresborough was not that of Clarke. The accomplice was at last driven to confess where the murdered man had been buried; the bones were exhumed and identified, and Aram was suddenly dragged from his ushership at Lynn Academy in Norfolk, and thrown into prison on a charge of murder. He was tried at York, 3d August 1759, and sentenced to be hanged within three days. At the trial he conducted his own defence, attacking with great acumen, plausibility, and curious erudition, the doctrine of circumstantial evidence. After his condemnation, he confessed his guilt, wrote a defence of suicide, but failed in an attempt to illustrate his essay. A factitious interest has been attached to Aram's miserable story from Lord Lytton's overpraised romance and Hood's powerful ballad. See E. R. Watson, *Eugene Aram, his Life and Trial* (1913).

Aramæ'a (from the Hebrew word *Aram*, signifying the 'highland,' in opposition to the lowland of Canaan) includes the whole of the country situated to the NE. of Palestine. It embraced the countries known to the Greeks by the various names of Syria, Babylonia, and Mesopotamia. *The Aramaic language*, a branch of the Semitic, was common to the whole country, and was divided into two principal dialects—the West Aramaic or Syriac, and the East Aramaic, or, as it is improperly termed, the Chaldee. The former was that spoken almost universally in Palestine in the time of Christ. After the Babylonian captivity, the pure Hebrew, in which the whole of the Old Testament, with the exception of a few chapters in Daniel and Ezra, had been written, gradually gave place to the Aramaic. It was the common tongue of Palestine in the time of Jesus, and his quotations from the Old Testament are from an Aramaic version rather than from the original Hebrew; as, for instance, the beginning of the 22d Psalm, which he repeated on the Cross; while all the Semitic words that occur in the New Testament, as well as in Josephus, are also Aramaic, as *Mammon*, *Raka*, *Eli*, *Eli*, &c.; *Talitha kumi*, *Abba*, &c. The Talmud, especially the Babylonian, has a large admixture of Aramaic elements, while the Targums are entirely composed in this idiom. The Aramaic dialect is, in general, the harshest, poorest, and least elaborate of all the Semitic languages, and has now almost entirely died out and given place to Arabic and Persian. In respect of development it stands midway between classical Hebrew and modern Arabic, having lost the severe simplicity of the one without gaining the flexible variety of the other. See SEMITES, TARGUM, MANDÆANS.

Aran, SOUTH ISLES OF, Ireland. These are three small islands lying NE. and SW. across the entrance to Galway Bay. Total area, 11,287 acres. The principal or west island, Inishmore or Aranmore, is 7 miles long and 2 broad; Inishmaan, or 'Middle Isle,' comes next; and then Inishere to the SE. The islands consist of carboniferous limestone, and rise to the height of from 200 to 354 feet on the west side, ending in cliffs facing the Atlantic. Most of the land is rudely cultivated. Inishmore is still known as *Aran-na-naomh*, or 'Aran of the Saints,' and many pilgrims still visit the old shrines and remains of churches scattered through the islands, as also the little beehive stone huts of the monks of the 6th and 7th centuries. There are several circular cyclopean fortresses of unhewn uncemented stones, of which the largest is Dun-Aengus, on Inishmore. Pop. 2700, mostly on Inishmore. See books by Burke (1887) and Synge (1907).

Aranda, PEDRO DE BOLEA, COUNT OF, born in 1718 of a distinguished Aragonese family, at first embraced a military career, but was appointed ambassador to the court of Poland (1759), governor of Valencia (1763), and president of the Council of Castile (1766). Aranda not only soon restored order in the capital, but limited the power of the Inquisition, procured the expulsion of the Jesuits from Spain, and suppressed the banditti of the Sierra Morena. In 1773 he was removed from his high position through the influence of the clergy, and sent as ambassador to France. Recalled in 1792, he had soon to retire to his own estates, where he died in 1799.

Aranea and **Araneidæ.** See SPIDER.

Aranju'ez (probably the Latin *Ara Jovis*), a town of Spain, on the left bank of the Tagus, 30 miles SSE. of Madrid by rail, in a beautifully wooded valley. The town is regularly built, with broad streets intersecting each other at right angles. The palace was long a favourite spring-resort of the royal family, and was altered and added to by successive sovereigns from Charles V. downwards. The famous gardens were laid out by Philip II.; their most splendid ornament are the great elm-trees brought from England by Philip II., which radiate from a central plot in twelve avenues. At Aranjuez was concluded a treaty between France and Spain in 1772, and it was also the scene of the abdication of Charles IV. in 1808. When the court was here, the pop. used to reach 20,000; now it is about 14,000.

Arany, JÁNOS, next to Petöfi the most distinguished of modern Hungarian poets, was the son of a poor peasant, and was born at Nagy-Szalonta, 2d March 1817. In 1832 he entered the college at Debreczin, but in 1836 joined for a time a company of strolling-players. Settled at Szalonta, he worked as a teacher and as a notary. When the Kisfaludy Society offered a prize for the best humorous poem, his *Lost Constitution* obtained the prize. In 1847 he forwarded to the same society his *Toldi*, a national trilogy, which made the poet a popular favourite. In 1848 appeared his *Conquest of Murány*, which, however, was not so successful. He took a slight part in the revolution, but after the war was allowed to return to his country. He was afterwards professor of Hungarian literature, director of the Kisfaludy Society, editor of a journal, and secretary of the Hungarian Academy (1865–70). Later works are *Katalin*, a continuation of *Toldi*, two volumes of lyrics, *Buda Halála*, and a humorous poem recounting his early adventures (1874). Part of *Buda* has been translated into English. He died 22d October 1882.—His son LÁZSLÓ (1844–98) was also noted as a poet and translator of Shakespeare.

Arapaim'a, a genus of tropical fishes, including the largest known fresh-water forms. They are found in the rivers of South America, and are sometimes taken in the Rio Negro, 15 feet in length, and 4 cwt. in weight. They are shot with arrows or harpooned, and are highly esteemed as food; salted, they are conveyed in large quantities to Para. The genus Arapaima belongs to the family Osteoglossidæ, allied to the Clupeidæ or herring, and is remarkable for the mosaic work of strong bony scales with which the body is covered. The head is also protected by bony armature. Osteoglossum and Heterotis are closely related genera, found in various parts of the tropics.

Ar'arat (Armenian *Ararat*), a general old name for the district through which the Aras flows, and never the name by which the Mount of Ararat has been known to the people around it. Associated, however, as the mountains of this district are in Genesis, viii. 4, with the landing-place of the ark after the flood, the name has been, naturally enough, appropriated to the highest peak, which in Armenian is called Massis or Massis Ljarn; in Tatar and Turkish, Aghri-Dagh, or curved mountain; and in Persian, Koh-i-Nuh, or Noah's mountain. The Chaldee legend, on the other hand, fixed the spot of Noah's landing in Gordyene, NE. of Nineveh and Mosul. The twin mountains of Ararat form an elliptical mass, 25 miles long from SE. to NW., by half that breadth, rising on the N. and E. out of the alluvial plain of the Aras, 2500 to 2800 feet high. The mass stands quite isolated on all sides but the NW., where a column 7000 feet high connects it with a long ridge of volcanic mountains extending westwards. From confluent bases of common level, 8800 feet high, the two peaks, both of entirely igneous formation, shoot upwards, Great Ararat to 16,969 feet, Little Ararat to 12,840 feet above the sea-level; the two summits 7 miles apart. From their isolation and bareness, the two peaks are very impressive—Little Ararat as an elegant cone of steep, smooth, regular sides; Great Ararat as a huge, broad-shouldered dome, supported by strong buttresses. The limit of perpetual snow rises in Ararat to nearly 14,000 feet. On the NE. side of Great Ararat is a remarkable chasm, 9000 feet deep, surrounded by monstrous precipices. There is a similar, but smaller, chasm on the SW. side. Ararat is singularly bare; the only wood of any extent, on the skirts of Little Ararat, at 7500 feet high, consisting of low birches. Ararat is perfectly dry throughout. Yet the mid-zone, from 5000 to 12,000 feet, is covered with good pasture, over which the Kurds wander in summer with their flocks. Below this mid-zone, Ararat has a steppe vegetation of dwarf prickly shrubs, and is unploughed and uninhabited. The top, at least during summer and autumn, is perfectly clear throughout the night, and till sometime after dawn. From 3 or 4 A.M., however, till sunset, clouds hang around Ararat for 3000 feet from the top. The view from the summit of Ararat, which towers over his neighbours much more than does Mont Blanc or Elburz, is singularly grand: there is the Caucasus, 280 miles away in the north; the dim plain of Erivan at the bottom; the extreme ranges of Taurus in the west; and a wilderness of bare red-brown mountains to the south and south-west. In 1828 the Tsar Nicholas annexed the territory around Erivan; and Little Ararat became the meeting-point of the Russian, Turkish, and Persian empires. On the 20th of June 1840 dreadful shocks of earthquake were felt. Great masses of the mountain were thrown into the plain, a ravine was closed, a convent and chapel disappeared, and the village of Arguri, and the gardens which

surrounded it, were buried under rocks, earth, and ice. Tournefort made a partial ascent of the mountain in 1700; since then, ascents have been made in 1829 by Professor Parrot of Dorpat; in 1850 by Colonel Chodzko, and a large party of Russians engaged in the Transcaucasian triangulation; in 1856 by Major Robert Stuart; in 1870 by Dr G. Radde and Dr G. Sievers; and in 1876 by Professor Bryce.

See ARMENIA; a long article in *Petermann's Mittheilungen* for 1871; Bryce, *Transcaucasia and Ararat* (4th ed. 1896); Lynch, *Armenia* (1901).

Aras (the ancient *Araxes*), the chief river of Armenia, rises near Erzerum, and flows rapidly eastwards past Ararat (q.v.) for over 500 miles into Kizilagatch Bay in the Caspian, passing through or along the borders of Armenia, Azerbaijan, and Persia. Until the end of the 19th century it was a tributary of the Kur. Cotton is grown along its course, and since 1906 much land has been reclaimed by irrigation in the Mugan Steppe between it and the Kur, with which an arm still links it.

Ara'tus OF SICYON, a distinguished Greek statesman, was born about 271 B.C. He liberated Sicyon from its tyrant, Nicocles, in 251, and united it with the Achaian League, of which he was appointed general in 245. Under him the league grew in influence. His great object was to unite the Greek states, and form an independent nation, but this was thwarted by their mutual jealousies and wars. The league ultimately fell under the power of Macedonia. Aratus was a brave general, a skilful tactician, and a disinterested patriot. According to Plutarch, he was poisoned in 213 by command of Philip III. of Macedon.

Ara'tus OF SOLI (or Pompeiopolis, in Cilicia), a physician and poet of noble birth, a contemporary of Callimachus and Theocritus (but not the Aratus who was the friend of Theocritus), lived mostly during the latter part of his life at the court of Antigonus Gonatas of Macedonia; at his instance he wrote, about 270 B.C., his astronomical poem, *Phænomena*, founded on the astronomical system of Eudoxos of Cnidos, and consisting of 732 verses. He appended to it another poem, *Diosemeia*, giving rules for prognostication of the weather. A pure style and correct versification mark both poems, but they lack originality and elevation. They were translated into Latin by Cicero, Cæsar Germanicus, and Festus Avienus (q.v.). Aratus was a native of the same province as St Paul, who quotes from him in his speech on Mars' Hill: 'For as certain of your own poets have said, We also are his offspring.' The best editions are by Buttmann (1826), Bekker (1828), and Köchly (1851); and there is a translation of the *Phænomena* into English verse by Robert Brown (1885).

Arauca'nia, the country of the Araucos or Araucanian Indians, in the south of Chile. The province of Arauco (2500 sq. m.; pop. 60,000), lying between the Andes and the Pacific Ocean, and bounded on the north by Concepcion, on the south by Valdivia, was formed in 1875, and has plentiful coal-deposits in the north. A large part of Arauco and of the neighbouring province of Valdivia, is occupied by Indians, who have for some time mostly submitted to Chilean authority. The Araucanians are interesting as furnishing the only example of Indian self-government in the presence of the European races. They are a fierce and warlike people, and have a kind of military aristocratic constitution. Formerly the government rested in the hands of four chiefs (*Toquis*), each nominated by one of the four divisions of the people, and one of whom was elected 'great Toqui.' They have no formal laws, but custom and tradition have all the force of these. They do not now number more than 50,000. Their country is divided from north to south into four parallel regions, with varying soil and climate. These are the coast region, the plain region, the region of the Lower Andes, and the region of the Higher Andes. Araucania has the proud distinction of being the only portion of the New World that has never received the European yoke. From the days of Pizarro and Almagro downwards, it has uniformly vindicated its freedom—its wars of independence having lasted, with intervals of precarious truce, from 1537 to 1773. In 1861 a French adventurer, Tounens by name, ingratiating himself with the Indians, was elected king of Araucania. Soon at war with Chile, he was captured and allowed to go to France. Returning to Araucania, he kept up a struggle with the Chileans in 1869–70, but from 1871 he posed in France as a dispossessed king, and died in 1878.

See CHILE, and books there cited; Tounens, *L'Araucanie* (1878); Smith, *The Araucanians* (New York, 1855); Medina, *Los Aborijenes de Chile* (1882); *Macmillan's Magazine*, August 1891; and Polakowsky, 'Die heutigen Araukanen,' in *Globus*, No. 74 (1898).

Araucaria, a genus of evergreen conifers, consisting of lofty trees, natives of South America and Australasia. *A. imbricata*, called also Chile Pine, Monkey-puzzle, or Puzzle-monkey, is a native of

Branch of *Araucaria imbricata.*

the Andes of Chile, forming forests on their western declivities, where it attains a height of 100 to 150 feet. The trunk is quite straight and free from knots, and yields abundant resin. Like many pines, the young trees have branches almost from the ground, but the older ones have tall naked stems with a crown of branches. The timber is heavy, solid, hard, fibrous, yellowish white, and beautifully veined. It is very suitable for masts of ships. The resin, which is white, has a smell like frankincense, and a not unpleasant taste. The seed is pleasant to the taste, not unlike the chestnut, and is a most important article of food to the Indians. The generic name is derived from that of a tribe, the Araucanians, who especially use it as food, raw, boiled, or roasted. A spirituous liquor is also distilled from it. A single cone sometimes contains between two and three hundred seeds, and one tree may be seen loaded with twenty or thirty of these. This araucaria was introduced into Britain in the end of the 18th century, and is now frequently planted, especially in small villa gardens, for which its stiffly symmetrical and unvaried form is, however, peculiarly unsuitable. It is the only species which can at all withstand the climate of Britain. It requires a well-drained soil, and is apt to suffer in severe winters. *A. brasiliana*, the Brazil pine, has a

looser and more spreading habit than *A. imbricata*. The seeds are sold as an article of food in Rio Janeiro, and the resin which exudes from the tree is mixed with wax to make candles. *A. excelsa*, the Norfolk Island pine, attains a height of 160 to 220 feet, free from branches to 80 to 100 feet, and with a trunk sometimes 11 feet in diameter. The wood is white, tough, close-grained, and so heavy as almost to sink in water. Diminutive specimens are seen in rooms. *A. Cunninghamii*, the Hoop Pine, a native of New South Wales, very much resembles the last. It attains a height of 60 to 130 feet, and a diameter of 4 to 8 feet. The wood is yellowish, and is used for boat-building, house-carpentry, and the common kinds of furniture. The large seeds of *A. Bidwillii* are used for food by the natives at Moreton Bay. The genus is represented in Papua by *A. Hunsteinii* and *A. Schumanniana*, both mighty trees; in New Caledonia there are *A. Balansæ* and *A. Cookii*.

Certain fossil Coniferæ found in the Carboniferous Sandstone have received the names Araucarites, Araucarioxylon, &c., and are closely allied to the existing forms, which, in fact, represent far more nearly than do any other trees the primitive forms of the Palæozoic age. Livingstone found such fossils in abundance on the Zambezi, and great trees of this type have been not uncommonly got in the Carboniferous quarries around Edinburgh.

Arauco. See ARAUCANIA.

Arau're, a town of Venezuela, South America, 60 miles ENE. of Trujillo, in a region noted for its fertility in the production of cotton, coffee, cattle, &c.; pop. about 10,000.

Araval'li, a range of mountains in Western India, extending for 300 miles in a north-easterly direction through Rajputana. They consist of a series of ridges and peaks, many of them mere heaps of sand and stone, bare of cultivation. The highest summit is Abu (q.v.), 5650 feet.

Arawak ('meal-eaters'), a tribe of South American Indians inhabiting British and Dutch Guiana and adjacent regions, cultivators of manioc and maize, comparatively advanced in civilisation. Kindred tribes extend over much of northern South America.

Araxes. See ARAS.

Arbalest. See CROSSBOW.

Arbe'la, now Erbil or Arbil, a small town of Assyria, east from Mosul, famous as having given name to the battle in which Alexander finally defeated Darius, 331 B.C. The battle was really fought near Gaugamela (the 'camel's house'), to the NW. of Arbela.

Arbitration is the adjudication by private persons appointed to decide a matter or matters in controversy. The proceeding generally is called a reference or submission to arbitration; the persons appointed to decide are termed referees or arbitrators; and their decision is called an award. This mode of settling disputes is frequently resorted to by the disputants themselves, who are anxious to avoid the delay and expense of proceedings in the ordinary courts of law; and it is with this class of arbitration that this article is mainly concerned. But an arbitration may also be brought about under the order of a court of law. Thus, in England, the High Court, in any civil action pending before it, has large powers to refer—in some cases with the consent of the parties, and in other cases without such consent—either the whole matter or some particular question arising in the action to a referee or arbitrator, whose authority is derived from the order of the court directing the reference; and the judge in a county court is also empowered, with the consent of the parties, to refer to arbitration an action pending before him. Moreover, many modern acts of parliament contain provisions for the settlement of disputes on particular matters by means of arbitration. Under some of these statutes procedure by arbitration is compulsory; under others it is at the option of the parties or one of them. Where provision is made for a statutory arbitration, the statute itself generally contains regulations as to the tribunal and the conduct of the proceedings. The more important statutes making special provision for arbitration in the event of dispute are the Agricultural Holdings Act, 1923; the Workmen's Compensation Act, 1906; the Small Holdings and Allotments Acts, 1908–1922; the Housing of the Working Classes Acts, 1890–1909; the Lands Clauses Acts, and the Acquisition of Land (Assessment of Compensation) Act, 1919; the Factory and Workshop Acts, 1891–1901; and the Friendly Societies Acts, 1896–1908.

In England the law as to arbitrations is now to a large extent embodied in the Arbitration Act, 1889 (52 & 53 Vict. chap. 49), which is practically a code on this subject. The act deals separately with 'references by consent out of court,' and 'references under order of court.' It also applies to every statutory arbitration, compulsory or optional, except in so far as its provisions are inconsistent with those of the particular statute regulating the arbitration in question.

A reference by consent out of court has its origin in a private agreement, termed a submission, by which two or more parties, between whom some dispute has arisen or may thereafter arise, agree to be bound by the decision of an arbitrator upon the matters in dispute. The authority of the arbitrator is derived from, and limited by, the submission. At common law a submission may be constituted by an oral agreement by the parties. But where the submission is oral the arbitration does not come within the provisions of the Arbitration Act, 1889. Consequently, in addition to other obvious disadvantages attending a parol submission, an arbitration so brought about, being governed solely by the common law, is exposed to the risk of being rendered abortive by either party revoking the authority of the arbitrator at any time before the award is made, and the award, when made, cannot be enforced except by action. Hence a submission is almost always constituted by a 'written agreement'; and where the submission is in that form, the whole arbitration is governed by the act, whether an arbitrator is named in the submission or not. If a written submission does not name an arbitrator or give directions for his selection, the act provides means whereby, in the event of the parties failing to concur in making the appointment, either of them can have an arbitrator appointed by the court. Again, under the act a written submission, unless a contrary intention is expressed, cannot be revoked except by the leave of the court; and such leave is not granted unless it is shown that the arbitration, if allowed to proceed, would fail to achieve the true justice of the situation between the parties. We shall therefore consider the case of a written submission to which the act applies.

The matters that may be referred to arbitration include all differences or disputes which might otherwise be determined by a court of civil jurisdiction or be settled by a valid agreement between the parties themselves. The matter in dispute may relate either to real or to personal property, and may turn either on questions of fact or on questions of law. Parties may agree to refer to arbitration not only existing differences between them, but also prospective differences. Thus in deeds of partnership, policies of insurance, and

other instruments of contract, it is frequently stipulated that if any disputes shall arise thereunder they shall be referred to arbitration. On the other hand, where a dispute arises out of a transaction which is clearly illegal or contrary to public policy, it cannot be the subject of an arbitration; for it could neither be determined in a civil court nor could a compromise, or agreement for its settlement made by the parties themselves, be enforceable at law. On the same principle felonies and criminal offences of a public nature are not arbitrable; for, in the public interest, such crimes require to be punished, and no settlement which the injured party might make with the accused offender would afford the latter any legal immunity. But in the case of certain misdemeanours, e.g. an ordinary assault or a charge of slander, where the wrong-doer is liable to a criminal prosecution and also to a civil action at the instance of the injured party, the law, even when a criminal prosecution has been commenced, permits an arbitration for the adjustment of the reparation to be made to the injured party.

As to the persons who may be parties to an arbitration, it may be stated generally that every person capable of making a contract may enter into a binding submission to arbitration. Thus a married woman, in virtue of the contractual powers conferred on her by the Married Women's Property Acts, is now capable of making a submission with regard to her separate estate, not subject to a restraint on anticipation. A submission to arbitration by an infant or person under age is subject to the limitations which affect other contracts entered into by him (see INFANT). A partner has no implied authority, in virtue merely of the relation of partnership, to bind his firm by a submission to arbitration; but a submission by one partner is binding on the firm if it is proved that the reference was for the purposes of the partnership business and was the usual way of carrying on such business, or if there is evidence that the reference was entered into with the knowledge or assent of the other partners. An agent may be authorised to enter into a submission on behalf of his principal; and, in that event, the award is binding on the principal alone and not on the agent, unless the latter expressly binds himself. The general authority which a counsel has over the conduct of an action does not empower him to refer the action to arbitration against the wishes of his client or upon terms different from those which his client has authorised; and if he does so refer it, the reference may be set aside. Executors, trustees, trustees in bankruptcy, with the consent of the committee of inspection, and companies registered under the Companies Acts are expressly empowered by statute to submit disputes to arbitration.

A submission does not necessarily bar legal proceedings; but if a party to the submission brings an action against the other party in respect of any matter which they have agreed to refer to arbitration, the court may, on the application of the other party, stay the action. The application may be made after the applicant has entered an appearance; but it must be made before he has taken any other step in the action. The court will stay the action, unless it is satisfied that there is a sufficient reason for the matters in dispute not being decided by arbitration in accordance with the submission.

The arbitrator ought to be a person who stands indifferent between the parties. The choice by the parties of the person whom they appoint to decide between them is perfectly free. Time and expense, however, are often saved by the appointment of a person who, by reason of his knowledge of law and his experience of judicial investigations, is able to confine the inquiry strictly to the matters in question, to estimate the evidence properly, and to avoid irregularities in respect of which the award might afterwards be set aside. A reference, unless a contrary intention is expressed in the submission, is deemed to be to a single arbitrator, and, if the submission contains no provisions for his appointment and the parties do not concur in making an appointment, the court may appoint the arbitrator. Where an arbitrator, whether agreed on by the parties or appointed by the court, refuses to act, or is incapable of acting, or dies, the court has power to supply the vacancy in the event of the parties themselves not concurring in making a new appointment. If a submission provides that the reference is to be to two arbitrators, one to be appointed by each party, and if one of the parties refuses to appoint his arbitrator, after being served with a seven days' notice by the other party, the party who has already nominated his arbitrator may appoint him to act as sole arbitrator. Where there are two arbitrators, the submission often provides that, in the case of their not agreeing in an award, the matter referred shall be decided by a third person, called an umpire. If the umpire is not named in the submission, the arbitrators themselves, even though they are not specially authorised to do so by the submission, have power to make the appointment at any time within the period during which they can make an award; and if they do not appoint an umpire, or he refuses to act, the court may appoint one. The umpire, if the arbitrators fail to agree, is substituted for them and is invested with the same powers. His duties, properly speaking, do not arise till the arbitrators are unable to agree; but in practice he usually sits with the arbitrators from the commencement of the proceedings, as, otherwise, all the evidence would have to be repeated before him. It is not permissible for the umpire, if either of the parties objects, to take any part of the evidence from the notes of the arbitrators. Sometimes a submission provides that the reference is to be to three arbitrators, as distinguished from two arbitrators and an umpire; but in that case, unless the submission bears that an award by a majority of the arbitrators shall be binding, the award is bad unless signed by all three arbitrators.

The proceedings before an arbitrator should be conducted, so far as may be practicable, in conformity with the rules observed in the trial of an action in a court of law, and an arbitrator is bound by the same rules of evidence as courts of law. He may examine the parties to the reference and their witnesses on oath or affirmation, and compel the production of documents in their possession relating to the matters in dispute. Any person giving false evidence is guilty of perjury, and may be punished as if the evidence had been given in court. The arbitrator must hear both sides and take evidence in the presence of both parties. If a question of law arises in the course of the reference, he may, on his own initiative or at the request of either party, 'state a case' for the opinion of the court; and if he refuses, at the reasonable request of either party, to state a case, an application may be made to the court to compel him to do so. The application to the court must be made before the arbitrator makes his award; but if he, after being requested to state a case, refuses to do so without reasonable grounds and makes his award before an application to the court can be made, the award may be set aside by the court.

The award must be in writing, and is chargeable with ten shillings stamp-duty (6 Edw. VII. chap. 20, sect. 9). Where the submission itself does not fix the time within which the award is to be made, arbitrators must make the award within three months

after entering on the reference; but, during that period, the time for making their award may be enlarged by a writing signed by them. Where the power of making the award devolves on the umpire, he must make his award within one month after the time of the arbitrators has expired, unless he has meantime, by a signed writing, extended the time for making his award. The time for making the award may be extended by the express consent of the parties to the submission, or, even after the time has expired, by order of the court. The award must decide all the matters referred to arbitration by the submission, and it must not go beyond these matters. It must be final and reasonably certain in meaning. Unless the submission expresses a contrary intention, the arbitrator may, in his award, deal with the question of the costs of the arbitration according to his discretion. An award is *primâ facie* binding on the parties to the submission, and may, by leave of the court, be enforced in the same manner as a judgment or order of court to the same effect. The application for leave is usually granted, unless the award is bad on the face of it or its validity obviously doubtful. If leave to enforce an award as a judgment is not granted, the party in whose favour the award is made may bring an action on it. Where an award proceeds on an oral submission or the party against whom an award is to be enforced is outwith the jurisdiction of the court, an action on the award is the only available remedy.

An award may be set aside by the court where the award has been improperly procured—e.g. if there has been a fraudulent concealment of material evidence; or where the arbitrator or umpire has been guilty of misconduct. It is accounted misconduct on the part of an arbitrator or umpire if he decides matters which were not included in the submission, or fails to decide all the matters referred to him in the submission; or if he hears one party and refuses to hear the other, or in some other way does not act fairly towards both the parties; or if there has been any grave irregularity in the proceedings. Instead of setting the award aside, the court has a discretionary power to remit it to the arbitrator for reconsideration and amendment.

References under order of court differ in their nature and effect from an arbitration proceeding on a submission by the parties. Under the Arbitration Act, 1889, such references are of two kinds, namely, (1) references for inquiry or report, and (2) references for trial. A reference for inquiry or report may be ordered by the court on any question arising in an action, subject to the rights of the parties to a trial by jury; but in practice such an order is only made where the investigation of the question in court in the usual way would occupy too much time. The duty of the referee is not to determine the question, but to investigate the facts or figures and report to the court. The court has also power in any action—with or, in special circumstances, without the consent of the parties—to make an order referring for trial either the whole matter, or a particular question arising in the action. The decision of the referee in a reference for trial is equivalent to the verdict of a jury.

In Scotland an arbitration takes place in virtue of a written submission executed by the parties. The persons appointed to decide are called arbiters, instead of arbitrators as in England; a third person, chosen to decide in the event of the arbiters differing in opinion, is termed an oversman; and the award in a formal submission is called a decree-arbitral. An arbitration may proceed on a formal or regular deed of submission or on an informal writing. A formal deed of submission defines the matter or matters referred to the decision of the arbiter, names the arbiter, sets forth his powers, specifies the time within which the decree-arbitral is to be pronounced, and binds the parties, under a stipulated penalty, to implement the decree-arbitral. It is also usual to provide that the submission, in the event of either party's death, shall continue in force against his heirs and representatives, and to insert a clause expressing the consent of the parties to registration, for preservation and execution, of the deed itself and of the decree-arbitral. The clause of registration is important, as it enables either party to enforce the decree-arbitral against the other party by the modes of execution appropriate to a judgment to the same effect. The Arbitration (Scotland) Act, 1893 (57 & 58 Vict. chap. 13), provides that an agreement to refer to arbitration shall not be invalid by reason of the reference being to a person not named, and that, unless the agreement to refer provides otherwise, arbiters shall have power to name an oversman. The statute also empowers the court to appoint an arbiter where the parties fail to concur in the nomination of a single arbiter, or where one party fails to nominate one of two arbiters; and also to appoint an oversman where the arbiters fail to agree in the nomination of an oversman. A formal arbitration proceeds generally in accordance with the procedure in Scots courts. Written pleadings, by way of a claim and answers, are ordered and lodged, and a record is made up upon these pleadings. It is a common practice for the arbiter, before issuing his decree-arbitral, to intimate to the parties his proposed findings, and to allow them, if so advised, to lodge representations. The parties in an action pending in a Scots court may, by joint minute, submit the matters in dispute between them to the adjudication of an arbiter. Such a submission is known as a judicial reference. The authority of the court is interponed to the joint minute, and, though the decision on the merits of the case is taken away from the court, the court's jurisdiction remains for the purpose of securing that the judicial referee exercises his powers and that his award is made effectual.

In the United States the common law with regard to arbitration is similar to that of England, and the legislation on the subject has proceeded on the same lines as in England. The provisions of the English Arbitration Act of 1889 have been adopted, without material alteration, in India and in many of the British colonies.

For English law, see *Russell on Arbitration* (11th ed. 1923). For international arbitration, see PEACE AND INTERNATIONAL ARBITRATION. For industrial arbitration, see ARBITRATION AND CONCILIATION.

Arbitration and Conciliation in Labour Disputes. Since the grouping together of large bodies of work-people, which is a feature of modern days, the prospect of strikes and lock-outs as a means of enforcing demands has been an ever-present difficulty, and has led all civilised communities to attempt by legislation to set up machinery for dealing with industrial disputes by arbitration and conciliation. *Arbitration* may be defined as the settlement of an issue on which the parties have failed to agree by the decision of an impartial person to whom the parties have agreed to refer it. The term *conciliation* is a somewhat indefinite one, including on the one hand cases of intervention by a third party (sometimes called *mediation*), and on the other hand shading into direct negotiations between representatives of the parties. The object of arbitration and conciliation is to provide a means whereby the parties, fairly and without loss of dignity, can settle their differences, preferably before a strike or lock-out occurs.

The history of the earlier legislation in the United Kingdom as to arbitration in trade disputes is described in a memorandum in the Report of the Royal Commission on Labour (1890–94). Conciliation and arbitration formed one of the main subjects of inquiry by this commission, and their report contains information on the subject with regard to this country, the dominions and colonies, and foreign countries.

Following recommendations by this commission, the Conciliation Act, 1896, which at present governs official action in trade disputes in this country, was passed. The act empowers the Board of Trade, where a difference exists or is apprehended between employers and workmen, (*a*) to make inquiry into the causes and circumstances of the difference, and to take steps to enable the parties to meet together under a chairman; (*b*) on the application of one of the parties, to appoint a conciliator or board of conciliation; (*c*) on the application of both parties, to appoint an arbitrator. The act also provides for the registration of conciliation boards, and authorises the Board of Trade to take steps to establish conciliation boards when this course seems expedient.

In 1908 the Board of Trade devised a scheme whereby, on the application of the parties, a court of arbitration of three (or five) persons selected from panels of chairmen, employers' representatives, and labour representatives might be appointed in place of a single arbitrator. This scheme did not curtail or replace any of the existing functions or practices under the Conciliation Act; its object was to remove the fear which workmen have sometimes expressed that individual conciliators and arbitrators, however fair they mean to be, do not intimately understand the position of the manual labourer. The scheme has in some cases proved acceptable to the parties when the appointment of a single arbitrator would have created difficulties. In the majority of cases the courts have consisted of three persons, and almost without exception the awards have been unanimous.

A further development occurred in 1911 when the government established an Industrial Council consisting of thirteen representatives of employers and a corresponding number of representatives of workpeople, 'for the purpose of considering and of inquiring into matters referred to them affecting trade disputes; and especially of taking suitable action in regard to any dispute referred to them affecting the principal trades of the country, or likely to cause disagreements involving the ancillary trades, or which the parties before or after the breaking out of a dispute are themselves unable to settle.' Sir George Askwith was appointed chairman of the council, and the Chief Industrial Commissioner's Department, through which the Board of Trade powers of conciliation and arbitration were now exercised, was at the same time established under his direction. Subsequently at the request of his Majesty's government the council made an inquiry respecting (1) the best method of securing the due fulfilment of industrial agreements, and (2) how far, and in what manner, industrial agreements which are made between representative bodies of employers and of workmen should be enforced throughout a particular trade or district. Their report was presented to parliament in July 1913.

With regard to the proceedings under the Conciliation Act, 1896, the number of cases dealt with showed a marked increase from and after 1910, and action was taken in most of the largest disputes. In the years immediately following the passing of the act application for the services of the department came mainly from one side only (generally from the work-people); but in the later years the majority of applications were made jointly by the parties, or by organisations representing them.

A marked feature of the industrial organisation of this country is the existence of a large number of *permanent voluntary conciliation and arbitration boards and joint committees*, which have attained marked success and in many cases have done extremely useful work. Among the earlier boards still in existence are the Board of Conciliation and Arbitration for the Manufactured Iron and Steel Trade of the North of England (formed in 1869), the Joint Committee of the Durham Coal-owners' and Miners' Associations, the Joint Committee of the Cleveland Ironmasters and Blast-furnacemen, and the Midland Iron and Steel Wages Board (formed in 1872). In addition, there are a number of arrangements (such as the late Brooklands Agreement in the cotton-spinning industry) which provide permanent machinery for dealing with differences by conciliatory means. The existence of these boards and agreements is only made possible by organisation on the two sides.

The functions of conciliation boards vary very considerably. The most frequent type is that which deals with any question submitted, whether of a general or individual character. Some boards, however, deal only with special questions, such as fixing the general level of wages or deciding questions of demarcation of work. The boards generally consist of equal numbers of representatives of employers and work-people, and it happens not infrequently that the two sides of the board are equally divided on questions brought before them. An important feature of the rules of procedure, therefore, is the provision made in many cases to avoid this deadlock, the difficulty being referred to an independent chairman or an arbitrator. The rules of a number of the boards provide, or it is understood between the parties, that there shall be no stoppage of working pending and during consideration of the matter.

Agreements and awards made in connection with conciliation boards, like those under the Conciliation Act, are not legally enforceable. In the rules of some of the boards, notably those in the boot and shoe trade, provision has been made for the establishment of a guarantee fund, and under certain circumstances money penalties are inflicted.

It will be seen that the system of industrial arbitration and conciliation in the United Kingdom is entirely voluntary. Under existing legislation there is nothing illegal in a strike or lock-out, and no compulsory powers exist for bringing about a settlement; there is no power to enforce the attendance at conciliation or arbitration proceedings of either party to a dispute, and no power to enforce an award. In this connection, however, it may be noted that the community has certain reserve powers, and the national strike of coal-miners in the spring of 1912 was terminated by parliament passing the Coal-mines (Minimum Wage) Act.

In recent years the right of the public to be informed with regard to labour disputes has been increasingly recognised, and will undoubtedly become in the future a prominent factor in such disputes. The influence of public opinion in securing the settlement of disputes has been utilised in this country under the Conciliation Act (e.g. the Dublin transport-workers' strike, 1913), and in other countries, but the principle is perhaps most clearly emphasised in the Industrial Disputes Investigation Act of Canada (described below).

During the war compulsory arbitration was enacted by the series of Munitions of War acts with three forms of tribunals, of which the Committee on Production was the chief; but compulsory arbitration ended soon after the armistice, and when Sir George Askwith retired in 1919 a Wages

and Arbitration Department of the Ministry of Labour was established in place of a Chief Industrial Commissioner, and the Industrial Courts Act provided that certain neutral chairmen and representatives of employers and employed should be available as arbitrators for the hearing of cases voluntarily submitted to them.

Strikes and lock-outs may roughly be divided into those arising from questions of material interest (such as alterations in wages or hours of labour) and those arising from questions of principle (such as the non-unionist question). In practice, conciliation or arbitration is much more feasible in the first class of cases, since such matters admit of compromise. If the parties are unable to agree by friendly discussion, they may agree to refer the matter to arbitration, or an already existing agreement may provide for reference to arbitration. The main advantage of conciliation over arbitration lies in the fact that conciliation leads to agreements the conditions of which are known to the parties before attaching their signatures, whereas under arbitration the parties bind themselves to accept conditions of which they are unaware. Further, arbitration awards rarely satisfy both sides, and there are sometimes complaints that arbitrators are unconsciously biassed. Generally speaking, the largest disputes are settled by conciliation rather than arbitration. In conciliation more especially much depends on the personality of the conciliator. Experience in this country has shown the desirability that conciliation and arbitration machinery should be simple and elastic, capable of being applied in various ways according to the needs of each case.

Opinion in this country in recent years has always been opposed to *compulsory arbitration*. The Report of the Industrial Council referred to above says: 'We do not view with favour the establishment of "compulsory" arbitration.' The question has on a number of occasions been debated at the Trades Union Congress, and defeated. Forms of compulsory arbitration have been adopted in certain Australasian states, and are described below. The chief difficulty attaching to compulsory arbitration lies in the impracticability, either by fines or imprisonment, of punishing large bodies of work-people for breach.

The British dominions and some of the principal foreign countries provide many interesting legislative experiments in industrial conciliation and arbitration, but in a short article it is not possible to emphasise all the features of their legislation. Attention may be drawn to the insistence of the rights of the public (Canada), compulsory arbitration (Australasia), power to summon parties to give evidence (Canada, &c.), enforcement of awards (Australasia, &c.), due notice of intended alterations in working conditions or of intention to strike or lock-out (Canada, New Zealand), and special disabilities respecting 'state' employees or employees in 'public utility' services (Canada, &c.). An inquiry by the Board of Trade in 1912 showed at least nine European countries with legislation designed to avert strikes of employees in public utility services. The voluntary arbitration and conciliation boards which play so large a part in the settlement of industrial disputes in the United Kingdom are rarely found in other countries.

In *France*, as in the United Kingdom, complete freedom to strike exists, with slight exceptions. Bodies known as *Conseils de Prud'hommes*, organised in groups of trades, and composed of employers and work-people in equal numbers, have existed since 1806 for the settlement of disputes affecting *individual* work-people. The law dealing with the settlement of *collective* disputes is the Voluntary Conciliation and Arbitration Act of 1892. Under this law either party to a dispute, or both parties jointly, may apply to the local justice of the peace for the appointment of a conciliation committee. If the application comes from one party, the justice must proceed to inquire whether or not the other party assents to the dispute being dealt with by conciliation or arbitration. In the case of a strike or lock-out the justice may himself take the initiative in the matter. These conciliation committees consist of representatives nominated in equal numbers by employers and work-people, and the justice presides. Should the conciliation committee fail to bring about an agreement, the justice invites the parties to accept arbitration. Particulars of cases dealt with and proceedings must be made public, and some attempt is thus made to bring the pressure of public opinion to bear on the parties. The disputing parties, however, are subject to no compulsion at any stage of the proceedings, and no method is provided for enforcing awards. It would appear that when the law is put into operation it is almost invariably on the requisition of the work-people, or on the initiative of the justice of the peace himself. In a considerable percentage of cases the offer of mediation is refused, for the most part by the employers. Where conciliation committees are formed by consent of both sides, a successful issue appears to be reached in a large proportion of cases.

In *Germany* two types of official conciliation tribunals have existed—the courts of arbitration for the guilds of handicrafts, and the industrial courts for the rest of the working-classes. Like the French *Conseils de Prud'hommes*, these industrial courts were formed primarily to adjust individual disputes and claims, but they also dealt with collective disputes. The imperial law of 1890 as amended by the law of 1901 required the establishment of industrial courts in all towns of over 20,000 inhabitants, and elsewhere they might be formed at the discretion of the government. Action had to be taken by the court in the case of a strike or lock-out on the joint request of the parties, and a court might also intervene on its own initiative or on the application of one party. If application was made by one party only, it was the duty of the president of the court (who was appointed by the local authorities, and must not be either an employer or employee) to make every effort to induce the other party to agree to refer the matter to the court. In each case the court consisted of the president and at least two representatives each of employers and work-people not themselves concerned in the dispute. In order to determine the facts of the dispute the president could require any person concerned in the dispute to attend the hearing and give evidence. In the event of failure to secure an agreement, the court embodied in the form of a decision its conclusions as to the terms upon which it considered the parties should agree, and called upon the disputants to declare their acceptance or rejection within a certain time. If either party did not accept the decision, the fact was made public. The industrial courts did not possess powers to enforce their decisions.

Although the machinery described above was voluntary, it should be borne in mind that strict control has been exercised in Germany over combinations of employees in the railway services, &c., and that undertakings carried on by the state or local authority have been held by the courts not to fall within the sections of the imperial code specifically granting freedom to strike.

In the *United States* industrial conciliation and arbitration is regulated by state law, except in the case of railroads, which are dealt with by the federal law. The basic federal law was the Act of June 1898 (slightly amended by an Act of

March 1911), commonly known as the Erdman Act, which applied only to persons engaged in actual train operation, and was less drastic than the earlier Federal Arbitration Act of 1888 which it superseded, except in its provision for the enforcement of awards by the United States courts where a voluntary arbitration had been agreed upon. The Erdman Act provided that in cases of disputes seriously interrupting or threatening to interrupt inter-state traffic, either party to the dispute might appeal to the chairman of the Inter-state Commerce Commission and the Commissioner of Labour to endeavour to mediate with a view to bringing about a settlement. No authority was reserved to the government to intervene on their own initiative, their intervention being conditioned by the receipt of a request for mediation from one of the parties and by the acceptance by the other party of the offer of mediation. Should such mediation prove unsuccessful, the mediators were to endeavour to induce the disputants to accept arbitration, the arbitrating body consisting of three persons—one each named by the parties, and the third chosen by these two or, failing that, by the mediators. During the eight and a half years following the enactment of the law only one attempt (in 1899) was made to utilise its provisions, and that attempt proved entirely fruitless. Subsequently, however, the act was invoked in a considerable number of cases and with increasing frequency. To meet criticisms made against the act, another act was passed in July 1913 which established a board of mediation and conciliation, with power to intervene on its own initiative, and permitted a board of arbitration to consist of six persons, instead of three as under the Erdman Act. Although complete freedom to strike exists in the United States, injunctions are frequently issued by the courts restraining railway servants from striking on the ground that such action would contravene certain federal statutes.

The machinery of conciliation and arbitration established in the different states varies, but the most common form is that of central state boards or commissions. A board consists, as a rule, of three members, appointed by the governor of the state, one being representative of the employers and another of the work-people, and the term of election varies from one to four years. A board may intervene on its own initiative, and must intervene at the request of either or both parties to a dispute. As a rule, the findings of a board are binding only when it acts on a joint requisition.

Canada.—Among the dominion experiments one of the most interesting is the Industrial Disputes Investigation Act, 1907, of Canada, popularly known as the 'Lemieux' Act, which was amended in some of its details in 1910. Prior to the Act of 1907 there had been, in addition to acts existing in some of the provinces, dominion legislation in 1900, 1903, and 1906. The immediate cause of the 'Lemieux' Act was a protracted strike of miners at Lethbridge, Alberta, which seriously threatened the supply of coal in Western Canada. The purpose of the act is to ensure the recognition of the interests of the public, as a third party, in trade disputes, and the insistence that that third party, through the government, shall have a voice in regard to a dispute affecting their interests, and, according to the act, before a stoppage of work takes place.

The act provides that in the event of any dispute arising in certain classes of industries (mining, transportation or communication, or public service utility) the matter must be submitted to a board of conciliation and investigation consisting of three persons, which board has the power of summoning and enforcing the attendance of witnesses, &c., the right of inspecting books, documents, &c., although the information obtained therefrom is not, except in so far as the board deems it expedient, made public. In the course of the investigation the board may take such steps as it deems advisable to bring about a settlement. If no settlement is arrived at, the board is required to make a full report to the Minister of Labour, with such recommendations as it sees fit for the settlement of the dispute, and this report is duly published. Pending the investigation no strike or lock-out can take place—and infringement is punishable by fines—but after the publication of the finding of the board the parties are free to take such action as they choose. In the industries covered by the act at least thirty days' notice of an intended change affecting wages or hours of labour must be given. If both parties to a dispute agree, the provisions of the act may be applied in the case of any other industry or trade.

The act has been copied in Queensland and the Transvaal. It formed the subject of a special inquiry by Sir George Askwith, on behalf of his Majesty's government, in 1912, and his report on the working of the act and its applicability to this country was presented to parliament in December of that year.

The *Australasian* legislation is important because of its experiments in compulsory arbitration. The acts which have been passed are numerous, but the Industrial Conciliation and Arbitration Act, 1894, of *New Zealand* is probably the best known by reason of its being the first attempt to establish compulsory arbitration in trade disputes, and it formed the basis of other Australasian legislation. It provided for the voluntary registration of associations of employers or work-people as 'industrial unions,' and the establishment of district boards of conciliation, with an independent chairman, to which a dispute might be referred, in practice only by a registered association. Strikes and lock-outs were prohibited only with respect to bodies on behalf of which cases were pending, or when they were subject to award. Failing settlement by the conciliation board the matter proceeded to an arbitration court. Under the original act disputes ordinarily went first to a conciliation board, except by agreement between the parties, but it was subsequently provided that either party might carry a dispute direct to the arbitration court, which in effect became the sole operative tribunal under the act. Under a further Act of 1908 (slightly amended in 1911) the reference of disputes became obligatory in the first instance to councils of conciliation, appointed *ad hoc*, and the court dealt with matters only if the councils failed to secure a settlement. In certain industries of the nature of public utilities fines were to be inflicted in the case of a strike or lock-out unless fourteen days' written notice had been given within one month previous to such strike or lock-out. This legislature formed the basis of the New South Wales Act of 1901 (which established a court of industrial arbitration, omitting the conciliation procedure of the New Zealand Act), the Western Australian Act of 1902, and the Commonwealth Act of 1904, which applied to disputes extending beyond the limits of any one state. In Victoria matters took a different direction, a system of wages boards being established to determine minimum rates of wages and other working conditions, the object being rather to put down sweating than to prevent industrial strife. An Act of 1908 introduced the system of wages boards into New South Wales, but also made it incumbent on the chairman to endeavour in the first instance to effect a settlement by conciliation, and provided for appeal to the industrial court. The prohibition of strikes and lock-outs of the earlier New South Wales Act was retained.

South Australia, Tasmania, and Queensland have

adopted the wages boards system, the two former, but not the latter, prohibiting strikes and lock-outs in respect to those trades for which wages boards have been formed and in connection with the determinations thereof. In the Industrial Peace Act of 1912 Queensland has adopted the provisions of the Canadian Act described above. The frequent recourse to amending legislation on this subject in Australasia appears to indicate the difficulty even in a new country of enforcing such restrictive measures, and official statistics seem to show that in spite of prohibitions a number of strikes do in fact occur. Recent legislation during and after the war has endeavoured to meet the difficulties of disputes confined to particular states and disputes affecting the interests of the whole Commonwealth.

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Arbor Day, in the United States, Canada, and elsewhere, a day set apart (differing in different states) for the planting of trees and shrubs by school children.

Arboriculture. See FORESTRY.

Ar'bor Vi'tæ (*Thuja*), an evergreen genus of coniferous trees and shrubs allied to the cypress. The common Arbor Vitæ (*T. occidentalis*) is a native of North America, especially between lat. 45° and 49°, but has long been well known in Europe. It is a tree of 20 to 50 feet high; the young leafy twigs have a balsamic smell, and both they and the wood were formerly in great repute as a medicine; the oil obtained by distillation from the twigs, which has a pungent and camphor-like taste, has been employed as a vermifuge. The wood of the stem is reddish, soft, and very light, but compact, tough, and durable, bearing exposure to the weather remarkably well. The tree is often planted in Britain as an ornamental tree, but does not attain so great a size as in its native country. It delights in cool, moist situations.—The Chinese Arbor Vitæ (*T.*, or *Biota, orientalis*), a native of China and Japan, immediately distinguishable from the former species by its upright branches and larger, almost globose and rough cones, is also a common ornament of pleasure-grounds in Britain and on the Continent; but it does not grow so tall as the preceding, and is more sensible of the cold of severe winters. The balsamic smell is very agreeable. The tree yields a resin having a pleasant odour, to which high medicinal virtues were formerly ascribed; hence the remarkable name, *Arbor Vitæ* ('tree of life'), given to this species, and extended to the genus. In its native country this species also attains the size of a considerable tree.—When the human cerebellum is cut vertically, a tree-like appearance seen is called *arbor vitæ*.

Arbroath', ABERBROTH'WICK, or ABERBROTH'OCK, a seaport and manufacturing town of Forfarshire, at the mouth of the Brothock Burn, 17 miles ENE. of Dundee. Here in 1178 William the Lion founded a Tyronensian abbey in honour of Becket; and here in 1214 he was buried. Cardinal Beaton was the last of its thirty-two mitred abbots. Next to Holyrood, the abbey was the most richly endowed monastery in Scotland. It was destroyed by the Reformers in 1560. The ruins of its cruciform church, which measured 276 by 160 feet, and was mainly Early English in style, are very picturesque, presenting a noble west doorway and a rose-window, 'the round O of Arbroath.' Dr Johnson greatly admired them in 1773. The chief industries of Arbroath are flax-spinning, engineering, the manufacture of boots, sail-cloth, and linen fabrics. The new harbour, begun in 1841, admits vessels of 400 tons; the old harbour was converted into a wet-dock (1871–77). Arbroath is a royal burgh, and with Montrose, Brechin, Forfar, and Bervie, returns one member to parliament. It is the 'Fairport' of *The Antiquary;* Auchmithie, 3½ miles to the NE., is 'Musselcrag;' and the Redhead Crags and Coves are scenes in the novel. The Bell-rock (q.v.) is 12 miles SE. Pop. 20,000.

Arbroath Flags are thin-bedded gray sandstones and flagstones which occur in the Lower Old Red Sandstone of Forfarshire.

Arbuthnot, or ARBUTHNOTT, JOHN, physician and wit, the friend of Swift and Pope, was born at Arbuthnott, in Kincardineshire, 29th April 1667. His father was the (Episcopal) parish minister, who was dispossessed by the Presbyterians after the Revolution. One of John's brothers fought under Dundee at Killiecrankie, and another in Mar's rebellion; John was, according to Chesterfield, 'a Jacobite by prejudice, a republican by reflection and reasoning.' He studied at Aberdeen and University College, Oxford, but took his M.D. degree at St Andrews (1696). He removed soon after to London, and there supported himself by teaching mathematics. In 1697 he published an *Examination of Dr Woodward's Account of the Deluge*, which brought him into notice as a man of no common ability. Accident called him into attendance on Prince George of Denmark; in 1705 he was appointed physician-extraordinary to the queen, and her death in 1714 was a severe blow to his prosperity. In 1715, along with Pope, he assisted Gay in *Three Hours after Marriage*, a farce that, in spite of the trio of wits, proved a complete failure. He pronounced the Harveian oration in 1727, and died 27th February 1735. Arbuthnot was one of the leaders in that circle of wits which adorned the reign of Queen Anne, and was still more nobly distinguished by the rectitude of his morals and the goodness of his heart. He was one of the kindest and trustiest of friends—'If there were a dozen Arbuthnot's in the world,' wrote Swift to Pope in 1725, 'I would burn my Travels.' Utterly careless of literary fame, he was the chief, if not sole author of that brilliant satire, the *Memoirs of Martinus Scriblerus*, first published in Pope's works (1741); and his too was the celebrated political *jeu d'esprit*, the *History of John Bull* (1712), which has so often been imitated. Its editor, Teerink, however (Amsterdam, 1926), gives it to Swift. Among his scientific works, the essays *On Aliments* (1731) and

Concerning the Effects of Air on Human Bodies (1732) possess much merit. The latter particularly displays a deep knowledge of physiological laws. See the *Life and Works*, by G. A. Aitken (1892).

Ar'butus, a genus of small trees and shrubs of the family Ericaceæ. *Arbutus Unedo*, the Strawberry Tree, is common on all the Mediterranean shores and (with gaps) extends along the Atlantic

Arbutus Unedo:
a, fruit; *b*, section of fruit.

to one locality in the British Isles, the Lakes of Killarney, where its fine foliage adds much to the charm of the scenery. In Britain, it is often planted as an ornamental evergreen. It grows to the height of 20 to 30 feet, but is rather a great bush than a tree. The bark is rugged; the leaves oblong-lanceolate, smooth, shining, serrate; the flowers nodding; corolla urn-shaped, greenish-white; the fruit scarlet, somewhat resembling a strawberry, with a vapid sweetish taste. A wine is made from it in Southern Europe, which, however, is narcotic, as the fruit itself is when eaten freely. The bark and leaves are astringent. *Arbutus Andrachne* is also sometimes cultivated as an ornamental plant in Britain, but is impatient of severe frosts. Its fruit is eaten in Greece and the East. But all the species seem to possess narcotic qualities. *Arbutus Menziesii* the madroño tree of Western North America, is a very interesting and beautiful species.

Arc. See JOAN OF ARC.

Arc (Lat. *arcus*, 'a bow') is any part of a curved line. The straight line joining the ends of an arc is its *chord*, which is always less than the arc itself. Arcs of circles are *similar* when they subtend equal angles at the centres of their respective circles; and if similar arcs belong to equal circles, the arcs themselves are *equal*. The length of an arc is readily found if the angle which it subtends at the centre of the circle is known, and also the length of the whole circumference. Let the whole circumference be 100, and the angle of an arc 50°, the length of the arc is

$$360° : 50° :: 100 : \frac{100 \times 50}{360} = 14 \text{ nearly.}$$

Arca, or ARK-SHELL, a genus of lamellibranchiate molluscs. See BIVALVES.

Arcachon, a watering-place (dating from 1854) in Gironde, France, on the S. side of the Bassin d'Arcachon, 34 miles SW. of Bordeaux by rail. The fine broad sands are admirably adapted for bathing; and the place is sheltered by sand-hills, covered with extensive pine-woods, in which game abounds. Its main street stretches 2½ miles along the shore, with the pine-forest immediately behind. The climate is always temperate, and the rainfall is but 32 inches. Its numerous villas amongst the firs are much frequented in winter by invalids afflicted with lung disease. Scientific oyster-culture is practised here on a large scale (see OYSTER). A fleet of motor-boats engages in sardine-fishing. Pop. 10,000.

Arcade (Fr.), a row of arches supported by columns, either having an open space of greater or less width behind them, or in contact with masonry. The arcade in Gothic corresponds to the colonnade in classical architecture. The term arcade is sometimes applied to the row of piers, or columns and arches, by which the aisles are divided from the nave of a church, or by which cloisters, or what are erroneously called piazzas in Britain, are enclosed; but it is more generally confined to those series of smaller arches which are employed simply for ornamentation. These are often found surrounding the square towers of English churches. The term is also applied, but improperly, to a glass-covered street or lane, with a row of shops or stalls on each side.

Arcadelt, JACOB (*c.* 1514–*c.* 1575), Netherlands composer, was a member, 1540–49, of the college of papal singers in Rome; in 1555 he entered the service of Charles, Cardinal Lorraine, and went to Paris, where he probably died. Many editions were printed in Venice of his famous five books of four-part madrigals (dating from the Italian period), and in Paris three books of masses and various motets.

Arcadia, the central and highest part of the Peloponnesus, was in length about 50 miles, in breadth about 40. According to Pausanias, it derived its name from the eponymous hero Arcas, the son of Callisto. Next to Laconia, Arcadia was the largest country in the Peloponnesus. It was girt round by a ring of mountains, which cut off to a large extent its communication with the rest of the peninsula. Mountains also intersected it in different directions. The western part of what was anciently Arcadia is wild, bleak, and rugged; the eastern is more fertile. The loftiest peak in Arcadia—the loftiest also in the Peloponnesus—is Mount Cyllene, in the north-east (7787 feet). The chief river is the Alpheus (q.v.). The modern province of Arcadia has an area of 2020 sq. m., and a population of 156,000. Originally Arcadia was named Pelasgia, after its first inhabitants, the Pelasgi. Subsequently, it was divided into several small states, which formed a confederation. Of these, the chief were Mantinea, Tegea, Orchomenos, Pheneus, and Psophis. The inhabitants, engaged chiefly in tending cattle and in hunting among the wild highlands, remained long in a state of barbarism. They were passionately fond of music and dancing, and were especially devoted to the worship of Pan and Artemis. Arcadia became both to ancient and modern poets the land of peace, innocence, and patriarchal manners; but the Arcadian shepherds of modern pastoral poetry harmonise but indifferently with the barbarous hill-men of ancient Arcadia.

Arcadius, first emperor of the East alone, was born in Spain, 377 A.D., and was the son of the Emperor Theodosius, after whose death in 395 A.D. the Roman empire was divided into East and West, the West falling to Honorius. Arcadius lived in oriental state and splendour, and his dominion extended from the Adriatic Sea to the river Tigris, and from Scythia to Ethiopia; but the real rulers over this vast empire were, first, the Gaul Rufinus, and afterwards the eunuch Eutropius, who openly assumed the reins of government and the command of the army, while the emperor reposed in luxurious indifference. In 399 Eutropius was for a time supplanted by another usurper, Gainas; and afterwards,

Eudoxia, the wife of the emperor, assumed the supremacy. The great archbishop, Chrysostom, was exiled by Eudoxia in 404, because of his stern denunciation of vice. During the reign of Arcadius, his territories suffered by barbarian incursions, earthquakes, and famine. He died in 408 A.D.

Arcani Disciplina. See DISCIPLINA ARCANI.

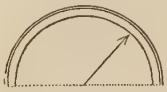
Arcanum, THE GREAT. In the middle ages, the Latin word *arcanum* ('secret') was used of any of the most valued preparations of alchemy; but the title was especially applied, as above, to the highest problems of the science, the discovery of such supposed great secrets of nature as the grand elixir. See ALCHEMY.

Arcesila'us, a Greek philosopher, founder of the New Academy, was born at Pitane in Æolia, Asia Minor, 316 B.C. He studied philosophy, first under Theophrastus the Peripatetic, and afterwards under Crantor. He ultimately became the head of the Academic school, or those who held the doctrines of Plato; but he introduced so many innovations that its philosophic character was completely changed in the direction of scepticism. His great rivals were the Stoics. He denied the Stoical doctrine of knowledge, which he affirmed to be, from its very nature, unintelligible and contradictory. He also denied the existence of any sufficient criterion of truth, such as the 'irresistible conviction' of the Stoics, and recommended abstinence from all dogmatic judgments. In practice he maintained that we must act on grounds of probability. A wit, a poet, and a man of frank and generous disposition, which seems to have captivated his disciples even more than his philosophy, he was yet accused of the grossest profligacy. He died 241 B.C.

Arcesilaus, the name of four kings of Cyrene, of the Battiad dynasty. ARCESILAUS I., son of the founder of the colony, Battus I., reigned B.C. 599–583.—ARCESILAUS II. (*c.* 560–550) 'the oppressive,' son of Battus II., failed to cope with a Libyan revolt and the opposition of his brothers, who withdrew and founded Barca. By one of them, or by a friend, the king was poisoned.—ARCESILAUS III. (*c.* 530–514), son of Battus III., sought to abolish the constitution set up in his father's time, was driven out, re-established himself by help of Samian mercenaries, submitted to Persia, and seems to have been driven out again, and assassinated.—ARCESILAUS IV. continued the same policy in vain. The monarchy ended with his death, *c.* 450.

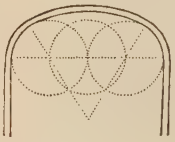
Arch, a concave structure of bricks, stones, or other materials built or turned on a centring over an open space, and so arranged as to support each other by mutual pressure, and to sustain a superincumbent weight. It was used by the ancient Egyptians and Assyrians and not unknown to the Greeks, though they did not employ it generally in their architectural structures. It is to the Romans that the nations of modern Europe are indebted for the use of the arch. The Romans most probably derived their acquaintance with it from the Etruscans, who, as well as the Pelasgians (q.v.) of Greece, made their arches pointed. The introduction of the arch by the Romans gradually effected a complete revolution in the architectural forms which they had borrowed from the Greeks. The predominance of horizontal lines gave way by degrees, till, in the works of the late empire, such as the palace of Diocletian at Spalato, the entablature was entirely omitted, and the archivolt sprang from the capital of the columns. The Greek traditions of architrave, frieze, and cornice were thus at last got rid of, and in the Romanesque and Gothic styles the arches sprang freely from the caps of the shafts. A very simple structure, frequently met with in the so-called Saxon early edifices in our own country, consists of two stones, their lower ends resting on rude piers, their tops leaning against each other, and thus forming two sides of a triangle, which is capable of supporting a moderate superincumbent weight. It is not impossible that out of this rude construction the arch, in its later and more elaborate forms, may have developed itself.

Of the arch itself, the following variations of form may be enumerated: the semicircle (1), the segment (2), the ellipse (3), which were the only forms employed by the Romans, and which alone were known in medieval architecture up to the time at which the pointed arch was introduced. The stilted arch (4) and the horseshoe arch (5) are modifications of these, and in both the centre or point



1. Semicircle.

2. Segment.

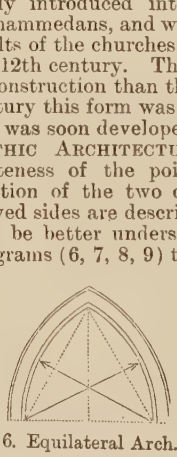


3. Ellipse.

4. Stilted Arch.

5. Horseshoe Arch.

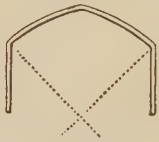
from which the arch is described is above the line of the impost; but in the former the mouldings are continued downwards vertically, whilst in the latter they are slightly inclined inwards, or the curve is prolonged till it meets the impost. The horseshoe arch belongs peculiarly to Arabian Architecture (q.v.), not only from its having been adopted along with the faith of the Prophet, but from its continuing to be used exclusively by his followers. The pointed arch, as we have seen, was employed by the Pelasgians, and examples are also found in Egypt and Persia of very early date. It was probably introduced into Western Europe by the Mohammedans, and was universally employed in the vaults of the churches of Provence from the 10th to the 12th century. This arose from its being simpler of construction than the round vault. In the 12th century this form was adopted in Northern France, and was soon developed into the Gothic style. See GOTHIC ARCHITECTURE. The greater or less acuteness of the pointed arch depends on the position of the two centre points from which its curved sides are described. Its various proportions will be better understood from the accompanying diagrams (6, 7, 8, 9) than from words.



6. Equilateral Arch.

7. Lancet Arch.

8. Drop Arch.



9. Segmental Arch.

Of the foil arches (10, 11, 12, 13, 14), or arches in which the forms of a leaf are imitated, the first three are examples of the trefoil, the fourth of the

cinquefoil, and the fifth of the polyfoil, the last being met with in Arabian and Romanesque buildings. At a later period of Gothic architecture,

10, 11, 12. Trefoil Arches.

with the decorated style, the ogee arch (15) was introduced, and the Tudor or four-centred arch

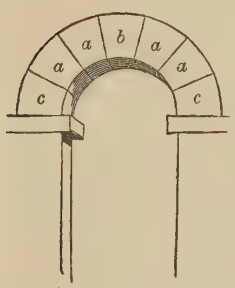
13. Cinquefoil Arch. 14. Polyfoil Arch.

(16) appeared about the commencement of the Perpendicular style. When first introduced, the

15. Ogee Arch. 16. Tudor Arch.

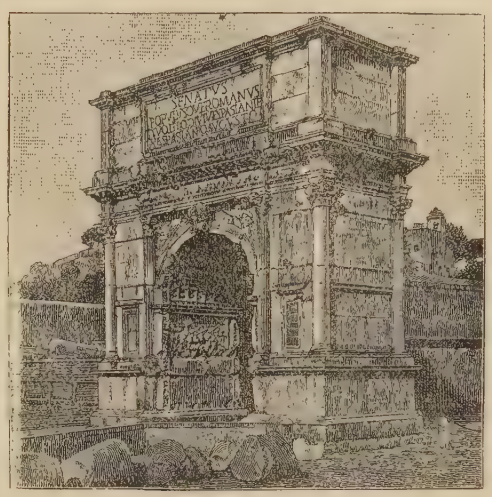
proportions of this arch were bold and effective; but it was gradually depressed till the principle of the arch was lost, and its very form was again merged first in three, and then in one flat stone or lintel over an opening. With the last form of the Tudor arch we thus reach almost the point of departure in the construction of the arch, and complete our enumeration of its forms.

The sides of an arch are termed *haunches* or *flanks*, and its highest part is called the *crown*.



The wedge-shaped stones, bricks, or other materials of which an arch is constructed, are called *voussoirs* (*a*, *a*, *a*); the uppermost one of all (*b*) is called the *keystone;* the lowest, which is placed immediately over the impost, the *springer*, (*c*), or springing-stone; the under or lower side of the voussoirs, the *intrados;* the upper side, the *extrados* or *back*. For the mechanical principle of the arch, and of the conditions of stability, reference must be made to works on mechanical engineering. See also BRIDGE, BUTTRESS.

Arch, TRIUMPHAL, a structure erected by the Romans across roads, or at the entrance of cities, in honour of victorious generals. The earliest triumphal arches were two erected by L. Stertinius (196 B.C.) in the Circus Maximus and the Forum Boarium. Under the emperors, these structures became numerous and magnificent, and were decorated with bas-reliefs and inscriptions. Of nearly forty built in Rome during that period, at least three remain, those of Titus (*circa* 82 A.D.), Septimius Severus (203 A.D.), and of Constantine (306–337 A.D.). Numerous similar monuments exist also in other parts of the old Roman empire, as at Rimini, Susa, Verona, Ancona, Orange (in France), Capura (in Spain). Napoleon proposed to adorn Paris with four triumphal arches, and erected in 1806 the Arc de Triomphe du Carrousel, between the Louvre and the Tuileries, after the model of the arch of Septimius Severus. The Arc de Triomphe de l'Étoile, beyond the Champs Élysées, was begun at the same time, but not completed till 1836. Through it the Germans marched on their entry into Paris in 1871. In London there is the Marble Arch, transferred to Hyde Park in 1851 from Buckingham Palace, where



Arch of Titus.

George IV. erected it at a cost of £80,000. It resembles the Arch of Constantine.

Arch, JOSEPH, was born on 10th November 1826 at Barford, Warwickshire, and, whilst still a farm-labourer, became a Primitive Methodist preacher. In 1872 he founded the National Agricultural Labourers' Union, and thereby, according to Mr Justin M'Carthy, 'began the emancipation of the rural labourers.' He afterwards visited Canada to inquire into the labour and emigration questions; and in 1885–86 he represented in parliament the north-west division of Norfolk, which again returned him in 1892 and 1895. He died 12th February 1919. See his autobiography (1898).

Archadelt. See ARCADELT.

Archæan System forms, in Geology (q.v.), the basement division of the stratified series of rocks. The rocks included under Archæan system consist principally of crystalline schistose rocks, and attain a thickness of many thousand feet. There is invariably an *unconformity* between them and the strata which happen to rest upon them. It is quite possible that some of the regions of crystalline schists which are described as belonging to the Archæan system may really pertain to a later date—because all that can be asserted of such crystalline schists is that they are older than the strata which immediately overlie them. Sometimes these overlying strata are of older, sometimes of younger Palæozoic, or even of Mesozoic and Cainozoic age. Two groups are recognised in the Archæan system—the *lower* or 'old gneiss formation,' consisting principally of coarsely crystalline gneiss, along with hornblende-schist, quartzite, and crystalline limestone. The *upper* group, or 'crystalline schist formation,' comprises chiefly mica-schists, chlorite-schists, talc-schists, phyllites,

and occasional conglomerates. The Archæan system is well developed in many different parts of the globe. It covers considerable areas in the Outer Hebrides and the western parts of Ross and Sutherland, and much more extensive regions in Scandinavia, Finland, and the NW. of Russia. Archæan rocks also form the core or central portion of many mountain-ranges, as the Urals, the Carpathians, the Alps, the Pyrenees, &c. They appear also in many of the hilly tracts of Middle Europe, as in Saxony, Bohemia, and Bavaria. In North America they extend from the region of the great lakes north to the arctic circle, and they also form the nuclei of many mountain-ranges in the same country. They have been recognised in the coast-ranges of Brazil, in Venezuela, and the Andes; and they likewise occur in India and New Zealand. In one of the crystalline limestones of the Archæan system in Canada occur the remains of what was formerly considered to have been a massive reef-building Foraminifer (*Eozoön*, q.v.), but is now believed to be entirely a mineral structure.

The archæan rocks are often penetrated by mineral veins from which large supplies of various metals have been obtained. Great masses of iron-ore form a marked feature of the archæan system in Canada.

Archæology (Gr. *archaios*, 'ancient,' and *logos*, 'a discourse') is the science which deduces a knowledge of past times from the study of their existing remains. The materials of the science are the relics of the human life of all former ages. Its methods, like those of the natural sciences, are both deductive and inductive. It regards the products of human handicraft which it investigates as manifestations of the ability and purpose of the men who made them. When these products are compared among themselves, the investigation proceeds to the determination of types, and their arrangement in a classified system. Comparison of the classified groups discloses gradations of adaptation and development of character which determine the sequence of the types. These sequences are tested by the associations of characteristic examples in the deposits in which they are found; and the general result is the recovery of such a logical story of the progress of culture and civilisation as the surviving relics of bygone ages are capable of disclosing. But the story thus recovered is not history. It proceeds by simple sequences, and not by a chronological specification of dates and measurement of durations. History deals with events and incidents as manifestations of human motive and action; archæology deals with types and systems as expressions of human culture and civilisation. The archæology of a historic period may be capable of illustrating and supplementing the records of contemporary historians by disclosing a multiplicity of unchronicled details relating to the common life of the people, of which we should have been otherwise left in ignorance. The historic or non-historic character of the time to be investigated has, however, no bearing on the methods of its archæological investigation. These are the same for all times and for all areas. But, as in other sciences whose materials are universally distributed, there is necessarily a limitation of its deductions to the special area investigated. The results of observation show that widely separated areas are characterised by widely different archæological types. As in Zoology or Botany it cannot be predicated of a typical form that it may not vary, or cease to exist in other areas, so neither can it be affirmed of an archæological type that it will necessarily be constant over any hypothetical area. The question which is always to be determined is, What is the area of the occurrence of the type?—and this is a question of observation, and not of induction. And as archæological types not only differ in different areas, but are known to have differed widely at different times within the same area, it is clear that the science must necessarily imply a series of investigations carried to completely exhaustive results in many different areas of the earth's surface before they can be compared and combined to form a science of archæology in its general or universal sense. But as no single area has yet been exhaustively investigated, the practical scope of archæology, for the present, may be defined to be the prosecution of the investigation to exhaustive results on their own areas by the more cultured nations. The basis of all scientific knowledge of archæology in every national area must be such a general collection of the remains of its human occupation as will be completely representative of all the various manifestations that have characterised the progress of its people towards the existing culture and civilisation. Hence in every country in which culture is not at a low level, a national collection of the monuments and relics of the progress and development of its national culture is now in process of formation. As the scientific knowledge disclosed by these national collections must necessarily increase in precision and value, according to the nearness of the approach of the collection to a thoroughly exhaustive representation of the area from which it is drawn, the science must be progressive in its results, and its conclusions can only be regarded as final when the collection of materials is complete. When the several national collections have reached this stage of representative completeness, a new departure of the science, in the direction, first, of comparative archæology, and secondly, of general archæology, will become possible.

In the meantime, the results of investigations have established, for the greater part of Europe and some parts of Asia, a series of stages of progress of industrial culture, marked by the successive use of stone, bronze, and iron, as materials for the fabrication of cutting tools and weapons. These stages of progress, when applied to a national area like that of Denmark, in which this division of prehistoric culture was first formulated, are spoken of as the Stone Age, the Bronze Age, and the Iron Age of the prehistoric inhabitants of that country. As these terms do not imply absolute divisions of time, and as they cannot be used unless with relation to the condition of a people, it follows that their succession was neither necessarily nor probably synchronous in different areas, and the same has to be inferred of their duration. The estimates, in terms of years, of the time that may have elapsed since the appearance of man in Europe with the passing of the Glacial Period have varied very widely, 100,000 and 4000 years representing the extremes. For South Scandinavia, De Geer gives the date of the end of the last glaciation as about 10,000 B.C., his method being to count the number of layers of sediment deposited annually in the sea by the summer melting of the ice during its retreat, adding thereto the number of similar layers, which, immediately after its uncovering by the retreating ice, began to be set down in Lake Ragunda to the north. The estimates of the duration of the three ages in the several parts of Europe are also various. Worsaae estimated the Stone Age in the Scandinavian north as from 3000 B.C. to 1000 B.C., the Bronze Age from 1000 B.C. to the Christian Era, and the Iron Age ending with the close of the Viking period, about 1000 A.D. Montelius gives for Sweden: the Stone Age ending about B.C. 1500, the Bronze Age from B.C. 1500 to B.C. 500, and the Iron Age from B.C. 500 to A.D. 1000. Sir John Evans gives 'with

all reserve' 1200 or 1400 B.C. as the probable close of the Stone Age, and beginning of the Bronze Age in Britain, and about 400 B.C. as the probable commencement of the Iron Age of Britain. But all such approximations must be taken as merely guesses at the probable dates they seek to represent. Sir W. Boyd Dawkins puts the case quite clearly when he says: 'The measurement of time absolute in terms of years, outside the reach of history, is beyond our power.' As a matter of fact, prehistoric archæology has no dates. But archæology, like geology, has a chronology of sequences, ascertained from observation and comparison of the deposits, and the types of their associated contents, which is sufficient for scientific purposes.

The study of archæology in any given area is thus a study of all the remains of man and his works occurring within that area, with the view of determining their relations to each other in time, and ascertaining their typical relations with corresponding remains in other areas. It includes the story of industry and art, and the development of human culture from its lowest to its highest manifestations; and also the history of civilisation, or the progress of aggregate communities, from the first simple principles of combination for mutual helpfulness, to the highest manifestations of social and political organisation.

Applied to the British area, archæology had till 1926 for Scotland, as for Denmark, Norway, and Sweden, no undisputed evidence of its occupation by man in the earliest period of the Stone Age, when the human species was, in certain other areas of Europe, contemporary with a group of extinct animals, these earliest remains being confined to England south of the Humber. But the whole area of England and Scotland presents traces of the cairn-builders of the closing portion of the Stone Age, who buried their dead in chambered cairns, and possessed the domestic animals still common in these countries. Their urns, or funereal pottery of fire-baked clay, were wide, shallow, round-bottomed vessels, decorated with rectilinear ornamentation, or pitted with the finger-nail. Their weapons were bows and arrows, tipped with well-made triangular or lozenge-shaped points of chipped flint, and axes of different varieties of polished stone. The Bronze Age is represented by a different set of burial customs, in cairns that are not chambered, the bodies being deposited singly, in cists of slabs, and accompanied by flat-bottomed urns, tall, or tapering to a narrow base, with rectilinear ornamentation encircling the exterior surface in bands. This system of single burial in cists, in place of aggregate burial in the chambers of a cairn, which distinguishes the Bronze Age sepulchral deposits from those of the Stone Age in Britain, prevails not only in the unchambered cairns, but in the barrows or artificial mounds of earth, and common cemeteries, or groups of interments in natural mounds and ridges of gravel and sand, as well as in the monumental cemeteries surrounded by circles of standing stones. The customs of cremation and unburnt burial appear to have existed side by side throughout the Bronze Age. The implements and weapons of the Bronze Age were made of an alloy of copper and tin, in the proportion of about nine parts of copper to one of tin, and were cast in moulds of stone or hardened clay, and their edges hammered fine and planished with a whetstone. They consist of knives of several varieties of form, daggers, swords, spear-heads, shields, axes of three varieties of shape—flat, flanged, and socketed—chisels, gouges, sickles, &c. The personal ornaments were made of bronze, but frequently also of gold, and consisted chiefly of penannular bracelets, necklets, diadems, and ear-rings. Throughout the Bronze Age flint arrow-heads continued to be used; and polished stone ornaments, such as bracers to protect the wrist from the recoil of the bow-string, and beads and necklaces of jet and amber, were common. The Iron Age introduces a system of curvilinear ornamentation of peculiar character for the surface decoration of objects of personal use and ornament, which still continue to be made of bronze or gold, though silver is now also common; and all the cutting implements and weapons are made of iron. The burial customs of the Iron Age are not fully disclosed for Scotland; but in the neighbouring area of the north of England the custom of burial in barrows, without cists of stones or sepulchral urns, but accompanied by horses and chariots and their harness and furniture, is shown to have prevailed. In the early Christian period, when grave-goods ceased to be buried with the dead, the archæological interest is transferred from the underground phenomena of the burial to its overground manifestations in monumental symbolism and memorial sculpture. The symbolism appears to have been developed into a system peculiar to the Scottish area; but the art of the memorial sculpture corresponds with that of the illuminated ornamentation of the early Celtic manuscripts of Gospels and Psalters, and with the decorative patterns of such articles of Celtic metal-work as chalices, crosiers, book-covers, and brooches of the same period. After the 12th century, the Celtic style of decorative art gave way to the European styles, introduced by freer contact with Continental influences; but the national style exerted a strong influence upon the monuments of the West Highlands and Islands of Scotland until the Reformation, and lingered in the decoration of brooches of brass and silver, the carving of dirk-handles and powder-horns, and the tooling of leather-coverings for targets, till after the last Jacobite Rebellion.

In former days our knowledge of past times was wholly derived from history and tradition. Their remains were regarded as the work of the gods, or assigned conjecturally to some race or order of historic fame, as the stone circles of Britain were given to the Druids, bronze weapons and implements to the Romans or Phœnicians, and the sculptured monuments of Scotland to the Danes. The professed antiquary of the 18th century, bound by the traditions of scholarly research, did little in the way of original investigation; but he unconsciously laid the foundation of the science by his passion for collecting. When the articles were brought together, classification suggested itself, and general deductions became for the first time possible. Thus flint axes and arrow-heads, stone whorls and variegated beads, ceased to be credited with superstitious attributes as thunder-bolts, elf-shot, amulets, and adder-stones, and came to be recognised as materials of science, capable of being utilised for the increase of knowledge. The formation of societies for the promotion of the study was a great step in advance. The Society of Antiquaries of London was incorporated in 1751, and the Scottish Society in 1780. The number of provincial and local societies has increased enormously, and their publications form an extensive body of archæological literature. The first systematic researches among the actual remains of antiquity were made by Rev. Bryan Faussett among the Anglo-Saxon tumuli of the Kentish Downs from 1757 to 1773. He was followed by Rev. James Douglas, who published his *Nenia Britannica, or a History of British Tumuli*, in 1793. Sir Richard Colt Hoare issued an account of his explorations of the tumuli of the Wiltshire Downs in 1820. More recently, the investigations of the tumuli of Derbyshire by Bateman, and of the barrows of Yorkshire and the north of England by Greenwell and Rolle-

ston, have supplied much authentic information of the burial customs of primitive times.

An extraordinary impetus was given in another direction by the announcement in 1847 of the discovery by M. Boucher de Perthes, in the valley of the Somme, of certain rude types of implements of flint in river-gravels enclosing remains of extinct animals. Though at first received with incredulity, these discoveries were afterwards amply verified, and the river-drifts of England, from Salisbury Plain in the south to the Yorkshire Ouse in the north, were found to yield the same forms of implements in similar association with remains of such extinct animals as the mammoth and woolly-haired rhinoceros, thus extending the antiquity of man far beyond the period of the tumuli and the surface finds, to which his remains had been hitherto supposed to be confined. Dr Schmerling, in 1833, had published his researches in the caves of Liège, in which he had found flint implements of similar types, also associated with remains of extinct animals; and his discoveries were subsequently confirmed and extended by those of M. Dupont in the caves of Belgium, of Messrs Lartet and Christy in the caves of Dordogne in France, and of Mr Pengelly and Sir W. Boyd Dawkins in those of England. In consequence of these discoveries, the Stone Age has been divided into two periods—*Palæolithic* and *Neolithic*, the former characterised by the use of flint implements fashioned and finished by chipping alone, as found in the river-drifts, or in the caves, which also yield evidence of an extraordinary faculty for art possessed by palæolithic man, who has left on their walls wonderfully spirited and characteristic drawings in pigment, or incised outline, of the animals he hunted, including the mammoth, urus, rhinoceros, and others now extinct in Europe, reproductions of which, in a series of monographs, have been issued by the Prince of Monaco, forming a splendid and convincing record of the subject. The discovery of the Swiss lake-dwellings in 1854, and their systematic description by Dr Keller, gave another impulse to investigation which extended the area of this phase of primitive life to Italy, Germany, and Austria. Lake-dwellings had been previously known and described by their Celtic name of crannogs in Scotland and Ireland, although their character and contents had been but little investigated. To elucidate the ancient modes of life, the habits and customs of modern savages have been studied, and the results applied to archæology by Avebury, Tylor, and Burton. Sociology, or the phenomena and methods of the development of civilisation, have been investigated by Herbert Spencer and Sir Arthur Mitchell. The exploration of historic sites, of which Layard was the pioneer at Nineveh, has been continued, with very important results, by Schliemann in Asia Minor and Greece, by Flinders Petrie in Egypt, by Evans in Crete, and by many others in these and other countries.

There are lectureships of archæology at Oxford, Cambridge, and Edinburgh, and English schools of archæology have been founded at Athens and Rome. Nearly all European governments have taken measures for the protection of ancient monuments; and in Denmark, Holland, and France the government has provided for the purchase of the sites of such monuments from the owners, in order to preserve them as national property. In Britain an act of parliament has been passed for the protection of ancient monuments, and subsequently royal commissions have been appointed for Scotland, England, and Wales to make a survey and inventory of these monuments and specify those worthy of preservation. Special provision has also been made for the ingathering of prehistoric relics to the different museums of national antiquities. The Royal Museum of Old Northern Antiquities at Copenhagen, established in 1816, and classified by Thomsen and Worsaae on the basis of the succession of the three ages now universally adopted, contains a completely representative series of the prehistoric antiquities of Denmark, one of its special features being the remains from the Kjökkenmöddings of the Baltic coast. The National Museum of France at St Germains, near Paris, has for its special feature the extensive collections from the river-drifts and the Dordogne caves. The national museums of Norway and Sweden, on the other hand, exhibit the remains of the Iron Age as they are nowhere else represented; while the museums of Zürich and Constance are specially rich in the lake-dwelling remains so characteristic of Switzerland. At Rome, the new Archæological Museum, under the direction of Pigorini, rapidly filled with the prehistoric remains of Italy; while the Vatican collection is rich in the remains of the Early Christian period. At Naples, the objects disinterred from the buried cities of Herculaneum and Pompeii are gathered into a museum of unrivalled interest. At Athens, the discoveries of Schliemann, and the explorations of the Archæological Society of Greece, have created a national museum of special importance. In Egypt, the museum of Cairo contains the results of the explorations of the tombs of the kings of the early dynasties, and an extensive collection of general antiquities from the valley of the Nile. At Washington, the United States National Museum already rivals the largest establishments of the Old World in the extent and variety of its ethnological collections. The British Museum in London, established in 1755, though rich in its general collections, possessed no department of British antiquities till a full century afterwards. The Scottish National Museum, founded by the Society of Antiquaries of Scotland in 1780, and maintained by them till 1856, when it was gifted to the nation and established as a national institution, and the Museum of the Royal Irish Academy at Dublin, both possess fairly representative collections of national antiquities. For American Archæology, see AMERICA.

The following books may be usefully consulted: GREAT BRITAIN AND IRELAND—Evans, *Stone Implements, Ornaments, &c. of Great Britain and Ireland;* and *Bronze Implements, &c.;* Davis and Thurnam, *Crania Britannica*, 2 vols.; Boyd Dawkins, *Early Man in Britain.* ENGLAND—Greenwell, *British Barrows;* Boyd Dawkins, *Cave-hunting in England;* Kemble, *Horæ Ferales.* SCOTLAND—Wilson, *Prehistoric Annals of Scotland*, 2 vols.; Anderson, *Scotland in Early Christian and Pagan Times*, 4 vols.; Stuart, *Sculptured Stones of Scotland*, 2 vols.; Drummond, *Sculptured Monuments of Iona and the West Highlands;* Munro, *Scottish Lake-dwellings* and *Prehistoric Scotland;* Allen and Anderson, *Early Christian Monuments of Scotland.* IRELAND—Wilde, *Catalogue of the Museum of the Royal Irish Academy;* Wood-Martin, *Lake-dwellings of Ireland.* FRANCE, &c.—Chantre, *Âge du Bronze en France*, 3 vols. 4to, and 1 vol. folio, plates; Lartet and Christy, *Reliquiæ Aquitanicæ;* Déchelette, *Manuel d'archéologie préhistorique celtique et gallo-romaine* (3 vols. 1908–14); Breuil and others, *Les Cavernes de Font de Gaume* (1910); Boule and others, *Les Grottes de Grimaldi* (1911–12); various works of Bertrand, De Mortillet, Boule, Breuil. SPAIN—*Les Cavernes de la Région Cantabrique* (2 vols. 1912); Cartailhac and Breuil, *La Caverne d'Altamira à Santillane près Santander* (4to, 1906). BELGIUM—Dupont, *Temps Préhistorique en Belgique.* DENMARK—Worsaae, *Pre-history of the North* (trans. 1886); *Industrial Arts of Denmark from the Earliest Times* (South Kensington Handbook); Madsen, *Afbildninger af Danske Oldsager*, 3 vols.; Engelhardt, *Denmark in the Early Iron Age.* SWEDEN—Hildebrand, *Industrial Arts of Scandinavia in the Pagan Time* (South Kensington Handbook); Montelius, *La Suède*

Préhistorique. NORWAY—Rygh, *Antiquités Norvégiennes.* FINLAND—Aspelin, *Antiquités du Nord Finno-Ougrien.* CENTRAL GERMANY—Lindenschmidt, *Alterthümer unserer Heidnischen Vorzeit.* SWITZERLAND—Keller, *Lake-dwellings of Switzerland.* AMERICA—Rau, *Archæological Collections of the U.S. National Museum;* Nadaillac, *Prehistoric America.* GENERAL—Avebury, *Prehistoric Times;* Wilson, *Prehistoric Man;* Stevens, *Flint Chips; Matériaux pour l'Histoire de l'Homme,* 20 vols.; Macalister, *European Archæology;* Burkitt, *Prehistory;* publications of Societies and Congresses. See such articles as:

Armour.	Cromlech.	Numismatics.
Avebury.	Cup-markings.	Ogam.
Barrows.	Dolmen.	Picts' Houses.
Beehive Houses.	Earth-houses.	Pottery.
Brasses.	Flint Implements.	Pyramids.
Brochs.	Glass.	Round Towers.
Bronze Age.	Hill-forts.	Runes.
Burial.	Iron Age.	Sculptured Stones.
Cairn.	Kent's Cavern.	Standing Stones.
Caves.	Kitchen Middens.	Stone Age.
Celtic Ornament.	Lake-dwellings.	Stone Circles.
Coffin.	Man.	Stonehenge.

Archæop'teryx, an extinct bird, the remains of which have been obtained in the well-known Solenhofen lithographic stone—a limestone of Jurassic age—which is quarried at Aichstadt in Bavaria. Only two specimens of the archæopteryx are known—one in the British Museum, and the other at Berlin. The bird appears to have been about the size of a rook. It was at first believed to be a reptile, then a transition form between reptiles and birds, but Professor Owen showed that it was a true bird. The anomalous structure which led the first observers astray was the tail, which, instead of consisting of a few shortened vertebræ united together into a coccygean bone, as in all

Remains of Archæopteryx in Solenhofen Stone.
(From Zittel's *Text-book of Palæontology,* by permission of Messrs Macmillan & Co., Ltd.)

known birds, recent or fossil, was formed of twenty elongated vertebræ, each of which supported a pair of quill-feathers. The metacarpal bones were not anchylosed, as in all known birds, from which it also differed in having two free claws belonging to the wing. The long lizard-like tail is not so anomalous as it at first sight appears, for in the early embryonic condition of the bird the vertebræ are distinct and separate, and the anastomosis which invariably takes place in the subsequent development of the embryo does not occur in the archæopteryx, so that it may be considered to exhibit the temporary embryonic condition of the bird as a permanent structure; and that this is the true position of this singular fossil is further established by the existence of other features which are found only in birds. These are the ornithic structure of the wings and legs, the occurrence of feathers, which are confined to birds, and the existence of a merry-thought (furculum), which is found in no other class of animals. In the Berlin specimen the skull has been preserved. It is shaped like that of a bird; a sclerotic ring is present, and there is a series of conical socketed teeth in the upper and lower jaws.

Archangel (*Arkhangelsk*), the capital of a Russian government, on the right bank of the Dwina, near its mouth in the White Sea. It is the seat of a bishop, and owes its name to the monastery of St Michael. Archangel is the chief commercial city for the north of Russia and Siberia. The port is open from May to November, ice-breakers curtailing the close season. The harbour is about a mile below the town, at the island of Solombaly; and 12 miles below are a government dockyard and merchants' warehouses. The bazaar or mart was built in 1668–84. Archangel has several colleges. The chief exports are timber, wheat, oats, pitch, tar, charcoal, turpentine, linseed, oilcake, flax goods, skins; coal and herrings are imported. The manufactures include cordage, canvas, linen, leather, beer, and sugar. It is connected by river and canal with a great part of European Russia. The town, which is the oldest seaport in Russia, dates its rise from a visit paid by the English seaman, Chancellor, in 1553; an English factory was soon afterwards erected, and a fort was built in 1584. When Peter the Great visited Archangel in 1693–94 the town was in the height of its prosperity, but his later policy after the founding of St Petersburg caused the town to decline. Since receiving the same privileges as the latter town, in 1762, Archangel has increased in prosperity. A narrow-gauge railway to Vologda was opened in 1898. The Great War in 1914, by closing the Baltic and Black Sea, enormously increased the importance and traffic of Archangel, and rapidly led to extensive port and railway improvements. It was occupied by a British force, August 1918 to September 1919. Pop. 70,000.—The population (420,000) of the government of Archangel (172,000 sq. m.), formerly Finnish, is now chiefly Russian with some Samoyeds. It includes the whole coast region between East Karelia and the Komi territory. The land lying within the arctic circle is desolate and sterile, and the people live chiefly by the chase. Southward, immense forests constitute the main wealth of the country. Gold, naphtha, and salt are found in various parts. See also WHITE SEA.

Archangel. See ANGEL.

Archangel, a name sometimes applied to *Lamium purpureum* and *L. Galeobdolon.* See DEADNETTLE, but cf. also ANGELICA.

Archbishop (Gr. *arch-*, and *episcopos,* 'overseer') is the title given to a metropolitan bishop who superintends the conduct of the suffragan bishops in his province, and also exercises episcopal authority in his own diocese. Occasionally, however, the title has been bestowed upon a prelate of a famous city, without his being made a metropolitan and having suffragans under him. The title arose, in the 3d and 4th centuries, from the provincial synods being held once or twice a year in

the chief town of the province under the presidency of the bishop of the place. Another cause of the origin of the title is said to be the custom of planting new bishoprics as Christianity spread, a slight supremacy being still retained by the original chief pastor over those newly appointed. In the Oriental Church, the archbishops are still called 'metropolitans,' from the circumstance first mentioned. In the African Church, on the other hand, the term used was 'primus.' The great archbishoprics of the early Church were those of Jerusalem, Antioch, Ephesus, Alexandria, Constantinople, and Rome. Since the 6th century, the Archbishop of Rome has claimed exclusively the name of Pope (*papa*), which early fathers—e.g. St Jerome—apply to all bishops, and occasionally even to presbyters. There is an official letter by Justinian, addressed to 'John, Archbishop of Rome and Patriarch;' and several ecclesiastical constitutions are addressed to 'Epiphanius, Archbishop of Constantinople and Patriarch.' The synod of Antioch, in 341, assigned to the archbishop the superintendence over all the bishoprics, and a precedence in rank over all the bishops of the church, who, on important matters, were bound to consult him and be guided by his advice. By degrees there arose, out of this superiority of rank, privileges which at length assumed the character of positive jurisdiction in ecclesiastical matters. Many of these rights passed to the Patriarchs (q.v.) towards the end of the 4th and during the 5th century, and still more to the pope in the 9th. The archbishops still retained jurisdiction, in the first instance, over their suffragans in matters which were not criminal, and over those who were subject to them they acted as a court of appeal. They possessed also the right of calling together, and presiding in, the provincial synods; the superintendence and power of visitation over the bishops of the metropolitan see; the power of enforcing the laws of the church; the dispensation of indulgences, and the like. The archbishops further enjoyed the honour of having the cross carried before them in their own archiepiscopate, even in presence of the pope himself, and of wearing the *pallium*.

In England there are two archbishops, of whom the one has his seat at Canterbury, the capital of the ancient kingdom of Kent; the other at York, the capital of Northumbria. But though as ruling over a province, not merely a single diocese, both have enjoyed the rank of metropolitans from the first, the Archbishop of Canterbury has all along enjoyed, not merely precedence as the successor of Augustine and the senior archbishop, but the possession of a pre-eminent and universal authority over the whole kingdom. This pre-eminence is marked in the titles which they respectively assume—the Archbishop of Canterbury being styled the Primate of all England (*metropolitanus et primas totius Angliæ*), whilst the Archbishop of York is simply called Primate of England (*primas et metropolitanus Angliæ*). It is also indicated by the places which they occupy in processions—the Archbishop of Canterbury, who has precedence of all the nobility (excepting those of the blood royal), not only preceding the Archbishop of York, but having the Lord Chancellor interposed between them. Previous to the creation of an archbishopric in Ireland, the authority of the Archbishop of Canterbury extended to that island. The amount of control which belongs to an archbishop over the bishops of his province is not very accurately defined; but if any bishop introduces irregularities into his diocese, or is guilty of immorality, the archbishop may call him to account, and even deprive him. In 1822 the Archbishop of Armagh, who is primate of all Ireland, deposed the Bishop of Clogher on the latter ground. Writers, however, who maintain the *jus divinum* of bishops over presbyters, do not claim more than a *jus humanum* for a metropolitan over his suffragans; and assert that, though a bishop may overrule a decision made by a majority of his clergy, an archbishop is bound to give way to a majority of the bishops of his province. To the Archbishop of Canterbury belongs the honour of placing the crown on the sovereign's head at his coronation; and the Archbishop of York claims the like privilege in the case of the queen-consort, whose perpetual chaplain he is. The province of York, consisting of the six northern counties and Cheshire, includes thirteen dioceses. The rest of England (with Wales till 1920) forms the province of Canterbury, and contains thirty dioceses. These include the dioceses of the two archbishops—i.e. the districts in which they exercise ordinary episcopal functions—which were remodelled in 1836. The diocese of Canterbury comprises Kent, except the city and deanery of Rochester, and some parishes transferred by this act; a number of parishes in Sussex called 'peculiars;' with small districts in other dioceses, particularly London. The diocese of the Archbishop of York embraces Yorkshire, except the portions included in the dioceses of Ripon, Wakefield, Sheffield, Manchester, and Bradford, and some detached districts. The election of an archbishop does not differ from that of a Bishop (q.v.); nor is the form of consecration essentially different, excepting that the oath of obedience to the archbishop is necessarily omitted. He writes himself 'by Divine Providence'—a bishop being 'by Divine Permission'—and has the title of 'Grace' and 'Most Reverend Father in God,' whilst a bishop is 'Lord' and 'Right Reverend Father in God.' The archbishop is entitled to present to all ecclesiastical livings in the disposal of diocesan bishops, if not filled up within six months. Every bishop, created or translated, was formerly bound to make a legal conveyance to the archbishop of the next avoidance of one such benefice in his see.

In England there are three Roman Catholic archiepiscopal sees, Westminster, Birmingham, and Liverpool; in Scotland two, St Andrews and Edinburgh, and Glasgow. In Wales there are one Protestant archbishop (Wales) and one Roman Catholic (Cardiff). In Ireland there are two Protestant and four Roman Catholic. Of the former, the Archbishop of Armagh is primate of all Ireland; the Archbishop of Dublin being primate of Ireland. They formerly sat alternately in the House of Lords, along with three bishops chosen by rotation.

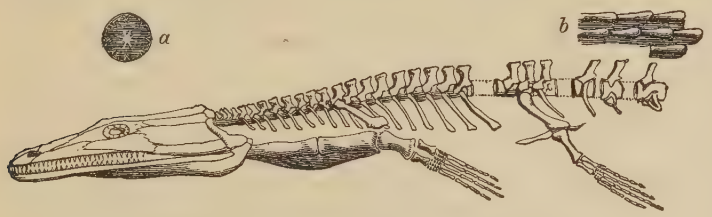
The United States are divided by the Roman Catholic church into fifteen ecclesiastical provinces, each under an archbishop, and each including several dioceses. The Protestant Episcopal church of the United States has about a hundred bishops, but no archbishop. The Roman Catholic church counts in all, throughout the world, over 200 archbishops of the Latin rite, over 30 of the Oriental rite.

Archdeacon, an ecclesiastical dignitary whose jurisdiction is immediately subordinate to that of the bishop. The archdeacon originally was simply the chief of the deacons, who were the attendants and assistants of the bishop in church affairs. His duties consisted in attending the bishop at the altar and at ordinations, assisting him in managing the revenues of the church, and directing the deacons in their duties. From being thus mere assistants, archdeacons in the 5th century began to share the bishop's powers, and step by step attained to an authority in many respects distinct from that of the bishop, and claimed a jurisdiction proper to themselves, and the right to appoint their own subordinates. Several synods protested

against the innovation, and in the 13th century their powers were limited by the establishment of episcopal courts. Their dignity and influence is now very much reduced in the Catholic Church. There was formerly one archdeacon for each diocese in England, but the act of 1840 following the report of the Ecclesiastical Commissioners in 1836 allowed two or more, and in nearly all dioceses there are four. No person can be appointed an archdeacon till he has been six years complete in priest's orders. The duty of parochial visitation has long been regarded as belonging specially to this office, and it was by its exercise mainly that the archdeacons attained to the dignity of ordinary instead of delegated jurisdiction. Even in performing this function, however, and in holding general synods or visitations, ordering repairs of churches, and the like, the archdeacon is properly to be regarded as being what the canon law called him, 'the bishop's eye.' The archdeacon is *ex officio* a member of Convocation (q.v.), and in his court hears from the churchwardens any representations of public scandal. The judge of the archdeacon's court, when he does not preside, is called 'the official.' There is an appeal to the Court of the Bishop, or in the case of an archdeacon of an archbishopric, to the Court of Arches. See DEACON, DEAN, PRIEST.

Archduke (Ger. *Erzherzog*). Archduke and archduchess are titles borne till 1918 by all the sons and daughters of an emperor of Austria, and by their descendants through the male line. The title of archduke was gradually assumed, from 1359, by the Dukes of Austria, as a mark of precedence over the other dukes of the empire, and was formally conferred on them by the Emperor Frederick III. in 1453, who himself, as duke, was the first recipient of the imperial gift.

Archegonium, a female organ found in Mosses (q.v.) and Ferns (q.v.). See also CRYPTOGAMIA. It is a flask-shaped body composed of a single thickness of cells, within which are the canal-cells and one egg-cell. In the presence of water the mucilaginous canal-cells swell and open the neck of the flask. A male gamete, attracted by some substance which diffuses from the archegonium, thus enters the neck of the flask and fertilises the egg, which proceeds to develop on the spot. The Pteridophyta and Bryophyta are sometimes grouped together as Archegoniatæ. Archegonia are also seen in Gymnosperms, but in the Angiosperms are reduced beyond recognition.



Archegosaurus: *a*, section of a tooth; *b*, scales.

Archegosaur'us, a remarkable fossil Stegocephalian. It had four long, slender digits, which obviously supported a longish narrow-pointed paddle, adapted for swimming. Externally, the body was protected by a covering of oblong quadrangular scales, which are preserved in some specimens. Several species have been described from the Permian. Owen regarded it as related to the salamandroid-ganoid fishes by the pattern in the plates of the external cranial skeleton, and by the persistence of the *chorda dorsalis*, as in the sturgeon, to the reptiles by the persistence of the *chorda dorsalis* and the branchial arches, and by the absence of the occipital condyle or condyles as in Lepidosiren, and by the presence of labyrinthic teeth as in Labyrinthodon, which, however, also ally it to the ganoid Lepidosteus.

Archela'us, (1) one of the Heraclidæ, the mythical founder of the royal house of Macedonia.—(2) A philosopher of the Ionic school, born at Athens, or, according to others, at Miletus. He was a scholar of Anaxagoras, and is said to have taught Socrates. He flourished about 450 B.C. He was the first to maintain the spherical form of the earth, which he inferred from his observation that the sun does not rise and set simultaneously at all parts of the earth, as must be the case were it a flat surface.—(3) King of Macedonia, a natural son of Perdiccas II., obtained the throne by murdering his half-brother in 413 B.C. His reign was aggressive towards Thessaly, but he introduced several salutary measures, and was a generous patron of art and literature. His palace was splendidly adorned with paintings by Zeuxis, and Euripides was among his guests. He is believed to have been murdered by his favourite, Craterus, in 399.—(4) A distinguished general under Mithradates the Great, sent to Greece with a fleet and a large army to oppose the Romans in 87 B.C. He was defeated by Sulla at Chæronea, and a second time, with immense loss, at Orchomenos, in Bœotia, in 86. Unjustly suspected of treason, Archelaus went over to the Romans at the outbreak of the second war in 81.—(5) The son of the preceding, married Berenice, daughter of King Ptolemy Auletes, in 56 B.C., and ruled over Egypt for the short space of six months during the banishment of Ptolemy.—(6) Ethnarch of Judæa, son of Herod the Great, succeeded his father in 1 A.D., and maintained his position against an insurrection raised by the Pharisees. His heirship to the throne being disputed by his brother Antipas, Archelaus went to Rome, where his authority was confirmed by Augustus, who made him Ethnarch of Judæa, Samaria, and Idumæa, while his brothers, Antipas and Philip, were made tetrarchs over the other half of the dominions of Herod. After a reign of nine years, he was deposed by Augustus, and banished to Vienne, in Gaul, where he died.

Archenholz, JOHANN WILHELM VON (1745–1812), German historian, wrote on the Seven Years' War and on English history.

Archer, FRED (1857–86), won the Derby five times, and was the foremost jockey till he shot himself when delirious with fever.

Archer, WILLIAM (1856–1924), born at Perth, studied at Edinburgh, and became a journalist and dramatic critic in London. He championed and translated Ibsen, wrote on English poets and dramatists, on Macready, and on America. *The Green Goddess* (1921) was a successful melodrama. *Three Plays* appeared in 1927 with a personal note by Bernard Shaw.

Archer Fish, a name given to certain small East Indian fishes of the Acanthopterygious family of Squamipennes or Chætodontidæ, which catch insects by spouting water from their mouths. The drops are surely aimed, and enveloping the desired insect, cause it to fall into the water, where it is instantly seized as prey. *Toxotes jaculator*, one of these species, is a fish about 6 or 7 inches in length, a native of Java and other parts of the Indian Archipelago, and is that to which the name archer fish has been more strictly appropriated. It can

project a drop of water to the height of 4 or 5 feet. *Chelmon rostratus*, also a Javanese fish, possesses the same power, and the Chinese in Java keep it in

Archer Fish (*Toxotes jaculator*).

jars for their amusement, causing it to practise its art by placing insects within its range.

Archery is the art of shooting with the bow and arrow. The use of these weapons was probably known to man at a very early period of his history, and triangular flint arrow-heads, chipped into the requisite shape, are found in all parts of the world, showing that they must have been known and largely used at a period anterior to the discovery of the working of metals. The bow is mentioned in Scripture as having been used in patriarchal times, and we know that all the leading nations of antiquity were acquainted with it. Assyrian sculpture and Egyptian hieroglyphics testify to its use among these peoples, and the Thracians, Cretans, Parthians, and Numidians were held in high estimation as archers. Homer frequently mentions bows; that of Pandarus was made of a goat's horns 'joined and shaped' 'with artful toil,' and tipped with gold. The poet alludes to it as being used, not only as a weapon of war, but in the sports of the arena, and describes a contest at what would now be called 'shooting at a popinjay' or bird fastened to the top of a mast. The Romans, too, did not disdain the use of the bow in warfare, though it probably did not form part of the arms of the regular legions, but was confined to the auxiliary troops. Procopius mentions that in Justinian's African campaign, the cavalry were clad in coats of mail, and were armed with swords and bows and arrows. The emperors themselves occasionally displayed their skill with the bow, and we are told that Gratian, Commodus, and Domitian were all accomplished archers. Asia, however, and not Europe, must be considered the home of the bow, and almost all the oriental nations have excelled in its use. The practice of archery is still a favourite sport among the Tatars, Chinese, and Persians; the Scythians gave their name to a bow shaped like a crescent moon. But no one country or continent can lay claim to the bow as exclusively its own; wherever man is found, he is almost certain to have taken with him his bows and arrows. They are used by Eskimos and Hottentots, South Sea Islanders and South American Indians. In warfare bows and crossbows were, though largely employed, regarded with disdain by the fully armed chevaliers of the middle ages; and Joinville plainly reflects the feeling of the knight that archers and arbalestiers were cowards, afraid to meet their enemies hand to hand. Archery was never brought to greater perfection than it was in England in the time of Edward III. That monarch devoted much attention to the encouragement of the art among his people, and the consequence was that English bowmen were the foremost in the world; and their prowess was amply proved by the large share they contributed to the successes of Cressy, Poitiers, Agincourt, and other battles. The English archers were all armed with the long-bow, while the French principally depended on the arbalest or crossbow, a powerful, but clumsy and unwieldy weapon. Archers continued to form a part of the English army long after the introduction of gunpowder; in 1572 Queen Elizabeth promised to place at the disposal of Charles X. six thousand men, of whom the half were archers. Archery decayed as firearms came into use. Charles I. endeavoured to revivify the art; and at the breaking out of the civil war, an attempt was made to raise a regiment of archers for the service of the king. Highlanders armed with bows, arrows, and quivers, were in the Covenanters' army at Duns Law in 1639. Cossacks similarly armed entered Paris in 1814.

In Scotland, archery never took such deep root as in the sister country, notwithstanding frequent statutory enactments regarding it. Doubtless owing to legislative encouragement, archery was, however, practised with some success throughout the country; but the people did not seem to take to it as they did in England, and Scottish archers never distinguished themselves on a field of battle.

Bows have assumed various forms in different countries, and have been made of several substances. The bows used in England were at first what are called *self* bows—i.e. made of one piece of wood, generally yew, throughout. Yew, however, being often difficult to procure, *backed* bows were introduced formed of two pieces of wood glued and pressed firmly together; and at the present time bowyers largely make *three-wood* bows, a method which is found to give additional pliancy and strength to the weapon. The weight of bows varies according to the requirements of the archer. A lady's bow may be bent with a pull not exceeding 28 or 30 lb., while a man may use one of double that strength. On an average, however, it will be found that a bow of about 42 lb. is most suited to ranges up to a hundred yards, while for greater distances one of between 50 and 60 lb. may be employed.

The manner of shooting with the bow has varied in different periods and peoples. In ancient times, it seems to be certain that the bow was pulled towards the breast, but it was latterly discovered that by drawing it towards the chin or right ear, much greater force was obtained. Of the different modes of quitting the arrow, an elaborate monograph has been written by an American author, Mr Morse. What he designates severally as the 'primary,' 'secondary,' and 'tertiary' release, have all the same inherent fault—viz. that the arrow is held between the finger and thumb while being quitted. This form of release is still practised by some of the North American Indian tribes. The 'Mediterranean loose,' as practised for ages by nations north and south of that sea, is the best practical mode of releasing the arrow. In it the bow-string is drawn back with two, three, or four fingers, usually three, the balls of the fingers clinging to the string, the terminal joints slightly flexed, the arrow kept in its place between the first and second fingers; the thumb straight, taking no part in the release. This method of quitting is found to be practised in regions as far apart as Siberia and the Andaman Islands. Assyrian sculptures show both the primary and the Mediterranean release, but it is probable that the latter was introduced only after the 9th century B.C. It

is supposed, however, to have been known to the Egyptians long before that date.

There is no doubt that early training and constant practice conduce to a wonderful degree of accuracy in the art of shooting with the bow, but the record of many feats of the kind must be taken with a considerable amount of caution; the amount of exaggeration contained in many such narratives has probably given rise to the proverbial phrase, 'drawing the longbow.' As a general rule, it may be held that at a greater distance than a hundred yards, great accuracy of aim is not attained, though marks may occasionally be hit at double that distance. Longer and lighter arrows are used for shooting at the greater distances; for butt shooting they are shorter, heavier, and blunter in the point. It was the boast of the English archers of the olden time that every man pulled a 'cloth-yard shaft.' Such an arrow, however, would be too heavy for very long distance shooting. One of the longest recorded shots in modern days was made with a very light arrow of about 25 inches length, by the secretary to the Turkish embassy in London, in 1794. He shot against the wind 415 yards, and back again with the wind 463 yards. This, of course, was a mere trial of distance shooting, and did not profess to be aimed at any particular mark.

The old English arrow was made of ash, weighed from 20 to 24 pennyweights, and was tipped with steel and feathered with goose feathers. South Sea Islanders show great ingenuity in tipping and barbing their arrows with fish bones and teeth. In South America the arrow-heads are steeped in a strong vegetable poison called curari or woorali, the basis of which is the juice of *Strychnos toxifera*, and which has fatal results in a surprisingly short time. The Bushman employs serpent poison and euphorbia juice. Putrid flesh is said to be used in some South Sea Islands, the poisonous effect of which is more frequently painful than fatal.

The ordinary mode of practising archery as a pastime, with most of the clubs in England, is shooting at targets placed at distances varying from 50 to 100 yards apart. The targets are 4 feet in diameter, and have a gold spot in the centre surrounded by rings coloured red, blue, black, and white with a border of green. Each of these rings possesses a different value, every hit in the gold being counted nine, in the red seven, in the blue five, in the black three, and in the white one. Whoever gets most value in hits wins the match. Another method of shooting is practised by some clubs, especially by the Royal Company of Archers in Scotland; in this, the targets are placed 180, or even 200 yards apart, and are only 3 feet across, or even less. The arrows used are lighter and longer than in ordinary target shooting, and every arrow hitting the target on whatever part, or 'making a *clout*,' as it is termed, scores two. Should no arrow hit, the nearest within four bows' lengths counts one.

There are a large number of clubs and societies formed for the practice of archery throughout Great Britain. Of these, the oldest is, curiously enough, a Scottish society—the Royal Company of Archers—who constitute the sovereign's Bodyguard for Scotland. Their records extend back to 1676, and there are traces of an earlier existence. Almost every notable Scottish family has been at some time or other represented in its ranks. Its affairs are directed by a council, but there are a large body of field-officers; the captain-general—who is always a nobleman of high rank—being Gold Stick for Scotland, the corresponding Gold Stick in England being held by the colonel of the Life Guards. In terms of a charter granted the Royal Company in 1703 by Queen Anne, they perform a service of presenting three barbed arrows to the sovereign when residing at Holyrood. The oldest existing society of archers in England, if we except the Honourable Artillery Company of London (which was originally a body of archers incorporated by Henry VIII.), is the Royal Toxophilite Society, founded by Sir Ashton Lever in 1780. The Woodmen of Arden was founded five years later. The Grand National Championships were instituted in 1844 under the laws of the Grand National Archery Society.

For a man, a bow of average length is about 6 feet, arrow about 28 inches; for a lady, 5 feet 6 inches, and 25 inches.

See Ascham's *Toxophilus* (1545); Ford's *Theory and Practice of Archery* (new ed. by Butt, 1887); Fittis, *Sports and Pastimes of Scotland* (1891); *Archery*, by Walrond and others ('Badminton' series, 1894).

Arches, COURT OF, a court belonging to the Archbishop of Canterbury, anciently held in the church of St Mary-le-Bow (*S. Maria de Arcubus*) in London. The official principal, from 1874 appointed by the Archbishops of Canterbury and York jointly, superseded the Dean of Arches; the court is now presided over by a judge, whose judgments are in some cases final, in some cases allow appeal to the judicial committee of the Privy Council. See ECCLESIASTICAL COURTS.

Ar'chil, or ORCHIL (Fr. *orseille;* Span. *archilla;* Ital. *orcello*), is a colouring substance obtained from various species of lichens. The archil is not originally present in the lichens, but is developed during a process of putrefaction and fermentation. The lichens, collected from rocks near the sea, are cleaned, ground into a paste with water, placed in tanks, and ammoniacal liquids—such as purified gas liquor or stale urine—added; when, by the combined influence of the ammonia, air, water, and the constituents of the lichens, a violet-coloured matter is generated, which appears for a time to dissolve in the water, but finally falls to the bottom of the vat in the condition of a moist powder or paste. The latter is then mixed with some substance like chalk or stucco, to give it consistence. Archil is soluble in water and in alcohol, to either of which it imparts a violet colour with a good deal of a crimson hue. It contains orcein, which can be obtained as an amorphous red powder, and to which it owes its tinctorial power. It is much employed in the dyeing of silks; but though a brilliant lilac hue is imparted to the fabric, the colour is not a permanent one, being easily acted upon by the rays of the sun. Hence the cloth is first dyed lilac by another colouring matter, and is then passed through an archil dye, which imparts its brilliant hue. Archil is seldom employed to dye cottons, but it is often used, along with indigo, in the dyeing of woollen cloth. Cudbear (q.v.) and Litmus (q.v.) are analogous to archil, and are obtained from the same lichens. The lichens which yield the best archil in largest quantity are *Roccella tinctoria* and *fuciformis*. The former is called the *Archil* plant; it grows very sparingly on the south coast of England, but is obtained in large amount from the Canaries and Cape Verde Islands, and from the Levant. It is of a substance between cartilaginous and leathery, roundish, pretty erect, branching in a dichotomous manner, of a grayish-brown colour, with powdery warts (*soredia*)—the *apothecia* (see LICHENS), orbicular, flat, horny, almost black. That from the Canary Isles is generally regarded as the best. It seldom exceeds the thickness of a pin, and is about an inch and a half in length. *R. fuciformis* now yields perhaps more of the Archil or Orchella weed of commerce than *R. tinctoria*. It differs from *R. tinctoria* chiefly in being not rounded, but flat, and in having the *apothecia* very distinctly

bordered. It grows in similar situations, and is also a native of Britain, but is abundant only in warmer climates, as on the coasts of Africa, Madagascar, &c.

Archil'ochus OF PAROS flourished about 714–676 B.C., and is regarded as the first of the Greek lyric poets, although the origin of the elegy is claimed for Callinus. Glimpses of his life, especially of the calamities which befell him, were frequently given in his writings. His father's name was Telesicles, his mother was a slave called Enipo. At an early age, becoming entangled in political contests, he abandoned his native place, and led a colony of the citizens to Thasos. While here, as he informs us in some extant verses, he lost his shield in a battle against the Thracians. Subsequently he was banished from Sparta, to which he had gone, either for his personal cowardice or because of the licentiousness of his verses. Having returned to Paros, he took part in the war which broke out betwixt it and Naxos, in the course of which he lost his life. The Delphian oracle pronounced a curse upon his slayer. He was distinguished for the rich variety and vigour of his lyrics. But the most noted characteristic was his satirical bitterness, insomuch that 'Archilochian bitterness' and 'Parian verse' became proverbial. He scourged his enemies in the most merciless fashion. It is said that Lycambes, who had promised his daughter Neobule in marriage to Archilochus, having failed to fulfil the promise, was so severely satirised by the poet, that to escape ridicule both father and daughter hanged themselves. Among the ancients, Archilochus was ranked with Homer, Pindar, and Sophocles. Even Plato calls him 'the very wise.' Horace, who largely imitated him in his metres, says that 'rage armed Archilochus with his own iambus'—thus emphasising the fact that to Archilochus we owe the application of iambic verse to satire. One of the forms he often used was called after him *Archilochian verse*. He also used trochaic verse, and many of his poems were hymns, elegies, and epodes. The best editions of his fragments are those of Schneidewin and Bergk.

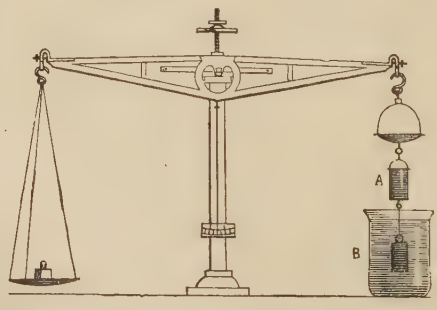
Archiman'drite (Gr. *archi-*, 'chief,' and *mandra*, 'a fold' or 'a convent'), the title of the highest order of superiors of convents in the Greek Church. See ABBOT.

Archime'des, the most celebrated of ancient mathematicians, was born at Syracuse about 287 B.C. He is said to have been a kinsman of King Hiero, though he seems to have held no public office, but to have devoted himself entirely to science. In regard to mathematics, we cannot estimate fully the merits of Archimedes without an exacter knowledge of the state of the science as he found it; we know, however, that he enriched it with discoveries of the highest importance, on which modern mathematicians have founded their methods of measuring curved surfaces and solids. Euclid considers only a few curved figures in relation one to another, but without comparing them with rectilineal surfaces and solids. The theorems necessary to this transition are laid down by Archimedes in his treatises 'on the Sphere and Cylinder,' 'on Spheroids and Conoids,' and 'on the Measurement of the Circle.' His demonstration that the area of a segment of a parabola is two-thirds of the inclosing parallelogram, is the first real example of the Quadrature (q.v.) of a curvilinear space. In his treatise on spirals, he rises to yet higher investigations, which, however, are not very easily understood, even by masters of the subject.

Archimedes is the only one of the ancients that contributed anything of real value to the theory of mechanics and to hydrostatics. He first established the truth that a body plunged in a fluid loses as much of its weight as is equal to the weight of an equal volume of the fluid. It was by this law that he determined how much alloy the goldsmith, whom Hiero had commissioned to make a crown of pure gold, had fraudulently mixed with the metal. The solution of the problem suggested itself to him as he was entering the bath, and he is reported to have been so overjoyed as to run home naked, exclaiming, '*Heurēka! Heurēka!*' ('I have found it! I have found it!') His boast, that if he had a fulcrum or stand-point he could move the world, betrays the enthusiasm with which the extraordinary effects of his newly invented machines inspired him. Among the numerous inventions ascribed to him is that of the endless screw, and the Archimedes' Screw (q.v.). During the siege of Syracuse by the Romans, he exerted all his ingenuity in the defence of the city. Polybius, Livy, and Plutarch speak with astonishment of the machines with which he opposed the attacks of the enemy. The improbable story of his having set fire to the ships by means of mirrors, rests on later narratives. When the Romans took the city by surprise (212 B.C.), Archimedes, according to the tradition, was sitting in the public square lost in thought, with all sorts of geometrical figures before him drawn in the sand. As a Roman soldier rushed upon him, he called out to him not to spoil the circle! But the rude warrior cut him down. According to his own direction, a cylinder inclosing a sphere was engraved upon his tombstone, in commemoration of his discovery of the relation between these solids—a discovery on which he set particular value.

His extant works, written in Doric Greek, were edited by Torelli (1792), Heiberg (3 vols. 1880–81), and Heath (1897–1912). *The Method of Archimedes* was discovered by Heiberg in 1906. See Life by Heath (1920).

Archimedes, THE PRINCIPLE OF, is one of the most important in the science of Hydrostatics, and is so called because the discovery of it is generally ascribed to the Syracusan philosopher. It may be thus stated: A body when immersed in a fluid weighs less than it does in vacuo by the weight of the fluid it displaces; or, A fluid sustains as much of the weight of a body immersed in it as is equal to the weight of the fluid displaced by it (see HYDROSTATICS). It is proved experimentally in the following way: A delicate balance is so arranged that two brass cylinders, A and B, may be suspended from one of the scale-pans, the one



under the other. The lower cylinder, B, is solid, or closed all round, and fits accurately into the upper cylinder, A, which is hollow. When the two cylinders are placed under the one scale, pan-weights are placed upon the other until perfect equilibrium is obtained. The cylinder B is now immersed in water, and, in consequence, the equilibrium is destroyed; but it may be completely restored by filling the hollow cylinder, A, with

water. The amount of weight which B has lost by being placed in the water, is thus found to be exactly the same as the weight of a quantity of water equal to its own bulk, or which is the same thing, to the quantity of water displaced by it. When bodies lighter than water are wholly immersed in it, they displace an amount of water of greater weight than their own, so that if left free to adjust themselves they float on the surface, only as much of their bulk being submerged as will displace a quantity of water weighing the same as themselves. Accordingly, while bodies heavier than water displace, when put into it, their own bulk, bodies lighter than water displace, when allowed to float on the surface, their own weight of the fluid. Bodies of the same weight as water, according to the principle of Archimedes, have no tendency to rise or sink in it, for the water displaced by them weighs precisely the same as they do. The toy called the Cartesian Diver illustrates this. Although the principle is generally established with reference to water, it extends equally to bodies immersed in air or any other fluid, for it is the result of gravitation alone, which is universal.

Archimedes' Screw (called also the *spiral pump*), a machine for raising water, said to have been invented by Archimedes, during his stay in Egypt, for draining and irrigating the land. Fig. 1 represents it in its simplest form. This consists

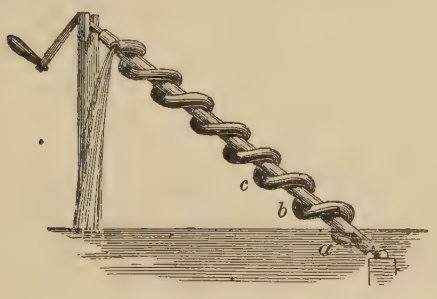


Fig. 1.

of a flexible tube bent spirally round a solid cylinder, the ends of which are furnished with pivots, so as to admit of the whole turning round its axis. The machine is placed in an inclined position, so that the lower mouth of the tube may dip below the surface of the water to be raised. In the position represented in the figure, the lowest bend, *a*, of the tube will be filled with water, and if now the handle is made to turn, as seen from the lower end of the tube, in the direction of the hands of a watch, the mouth of the spiral tube will be raised above the surface; and the water inclosed in the tube, having no means of escape, will flow within it until, after one revolution, it will occupy the second bend, *b*. The first bend, *a*, has meanwhile received a second charge, which, after a second revolution, flows into the second bend, *b*, and takes the place of the first charge, which has now moved into the third bend, *c*. When, therefore, as many revolutions of the cylinder have been made as there are turns in the spiral tube, each of the lower bends will be filled with water; and in the course of another revolution, there being no higher bend for the water of the first charge to occupy, it will flow out of the tube by its upper mouth. At each succeeding revolution, the lowest bend will be charged, and the highest discharged. It will be seen from the figure that there is room to dispose a second tube side by side with the first, round the cylinder, in which case the screw would be called double-threaded. In the ordinary construction of these machines, the cylinder itself is hollowed out into a double or triple-threaded screw, and inclosed in a water-tight case, which turns round with it, the space between the threads supplying the place of such tubes as are seen in fig. 1. Fig. 2 represents a double-threaded Archimedes screw of this description, with the case removed in front. It is sometimes found

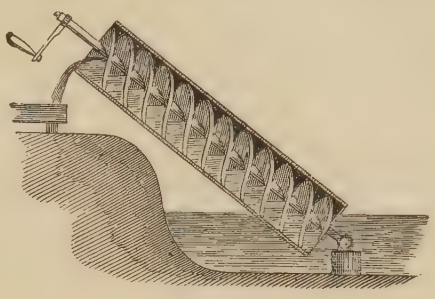


Fig. 2.

convenient to fix the exterior envelope, and to make the screw work within it, the outer edge of the latter being as close as possible to the former without actual contact. This modification of the Archimedes screw receives the name of water-screw, and frequently of Dutch screw, from its use in Holland for draining low grounds.

Archipel'ago (from 13th-century Italian *arcipelago*, 'the main sea;' Gr. *archi-* and *pelagos; archipelagos*, not an old Greek word, is sometimes used in modern Greek), a term given to that part of the Mediterranean which separates Greece from Asia (the Ægean Sea of the ancients); but now extended to any sea, like it, thickly interspersed with islands, or rather to the group of islands themselves. All archipelagoes fall naturally into two groups, the oceanic and the continental. The latter either lie close to the mainland, or are so dotted about the sea as to join, like stepping-stones, two continents. Such are the Chiloe, Patagonian, Arctic, and other groups. The oceanic archipelagoes stand alone, and include the Marquesas, the Sandwich Islands or Hawaii, Fiji, and the Friendly Islands. These, as well as Japan, Novaya Zemlya, Spitsbergen, Franz-Josef Land, and any others loosely called archipelagoes, will receive separate notice in their places. The islands in the Greek Archipelago consist principally of two groups, called Cyclades and Sporades; the first from their *encircling* the sacred island of Delos, the second from their being *scattered* in a wavy line. The former lie to the east of Southern Greece, while the latter skirt the west of Asia Minor. The numerous islands which stud this sea range in size from the merest barren rocks to Crete, with an area of 3326 sq. m. Most are of volcanic origin, with high bluffs rising abruptly from the sea. Many are very fertile, producing wheat, silk, cotton, wine, honey, figs, oranges, raisins, and other fruits. The people of the Sporades are employed in fishing for sponge and coral. The climate is healthy, the men are hardy, and the women noted for their beauty, of a pure Greek type. Of the Cyclades, all belonging to Greece, the principal are: Syra, Delos, Tenos, Andros, Cythnos, Thera, Naxos, Melos, and Paros. The chief islands of the Sporades are: Carpathos, Rhodes, Cos, Patmos, Icaria, Samos, Chios, Lesbos, Lemnos, Tenedos, Imbros, Samothrace, and Psyra, all Turkish till 1912, when Italy occupied the first four as pledges for the fulfilment of the Treaty of Ouchy (see TRIPOLI), and Greece secured the rest, save Imbros and Tenedos. Italy retained Rhodes and the Dodecanese (q.v.) by the Treaty of Lausanne

(1923). The northern Sporades, off Eubœa—Scyros, Icos, Scopelos, Sciathos, &c.—are also Greek. See separate articles; also GREECE, TURKEY.

Architecture is the art of building or constructing. In this country, architecture is usually divided into Civil, Military, and Naval. In the present article we shall confine ourselves to the first, the two others being treated of, the former under the head of FORTIFICATION, the latter under that of SHIPBUILDING.

The construction of bridges, and especially stone bridges, piers, quays, &c., is just as much a department of architecture as of civil engineering, though in modern times the principle of division of labour has been introduced, and this department has been assigned to the engineer.

Civil Architecture has a scientific or constructive side, and an æsthetic or artistic side. The first relates to the strength, the safety, the convenience, and the comfort of a building, as well as to the nature of the materials used in its construction. The second relates not only to the forms and proportions of its principal features, but to its decorative character, produced by such details as columns, mouldings, tracery, carving, applied sculpture, and inlaying, which in all good architecture are founded on the constructive elements.

The constructive part of architecture, including masonry, carpentry, ironwork, and minor matters, is dealt with under BUILDING. Rude stone monuments are such as consist of separate stones or remains of very rude construction. Dolmens, cromlechs, stone circles, and the Scottish brochs are examples of these, and are treated under their several heads. Every nation which has risen above the condition of the savage has adopted some special mode of building suitable to its wants, its climate, and its customs. This is invariably accompanied with a certain style of decoration, arising from the peculiar genius and surroundings of each people. Such styles are usually very persistent in each race, and are handed down traditionally from age to age, and carried from one country to another. Thus the ancient monuments of a country generally serve as a sure index of the people who inhabited it at the time of their erection, just as the names of places preserve the language of their early occupants. Through commercial and other intercourse, the artistic traditions of one country came to be adopted in others, and received different developments in each, as nations rose and fell in the progress of civilisation.

The later and more refined architecture of a country is generally based on some primitive, simple idea. Thus, in the early and rude times of nearly all nations, it has been the practice to erect a large single stone, or to heap up a pile of stones, as a monument to commemorate some great event. In Egypt and elsewhere we see this primitive idea preserved and developed in the great pyramids and obelisks of a later and more cultivated age. Under the Romans, a similar tradition is exemplified in the sumptuous mausoleums and commemorative pillars of the empire.

In the construction and decoration of buildings, the same principles hold. However elaborate and diversified the edifices of different times and countries may be, all their styles may be traced back to the two chief building materials of wood and stone. Every principle of architecture may be shown to be founded on the forms naturally adopted for construction in one or other of these materials. Wooden construction manifests itself in upright pillars with beams laid across them, hence called the *trabeate* system, while genuine stone building is distinguished by the employment of the arch with its necessary abutments. Most of the nations of antiquity, notably Egypt and Greece, although acquainted with the use of the arch, preferred not to employ it in their monuments, but to adhere to the earlier and simpler trabeate type of the pillar and beam; and the details of their architecture, although executed in stone, contain evidences of their wooden origin in the traditional wooden features of triglyphs, metopes, &c.

The arch was well known to the Egyptians and Assyrians, and was used by them in tunnels and drains, but it was never adopted as a leading feature in architecture till about the time of the Roman empire. This emblem of true stone architecture, once permitted to take a prominent place in their edifices, soon showed its power by completely revolutionising the whole system. The external architecture, which the Romans had borrowed from the Greeks, was gradually converted into an internal architecture resulting from the development of arch-construction. From this principle, first adopted by the Romans, the whole of the subsequent architecture of Byzantium and the middle ages was evolved.

We thus see that the essential principles common to all architecture were handed down from one country and from one state of civilisation to another. In the same way, the decorative features developed in one age and country had great influence on succeeding nations. Egyptian art influenced Assyrian both in general forms and details, and both lent their aid to the Greeks; although that influence is now recognised to be much less than was believed before the discovery of the imposing remains of Minoan architecture in Crete (q.v.) since 1900. The moulding of Roman by Greek art is very apparent in every feature, while the influence of the latter on Byzantine and Gothic, although more subtle, is none the less powerful.

This article treats very briefly of the history of the various styles of architecture, of which more details are given under their separate headings.

Egyptian.—The history of architecture may be said to begin with the construction of the Egyptian Pyramids, 3000 years or more before the birth of Christ, but it is long after this—namely, 2570 B.C.—ere we find in Egypt a form of structure which contains the germ of a style practised at a later age in Greece. One or more of the tombs at Beni-Hassan are of the latter date, and have pillars which have so much in common with the style of those of the earliest Grecian temples, that they have been said to belong to a pre-Doric order. No doubt the great temples at Thebes, Karnak, and other places, built at a still later time than these tombs, more or less determined the general forms of buildings of a similar nature subsequently erected in Assyria.

Assyrian.—Assyria comes next to Egypt for the age and importance of its buildings. The remains of some of these, which are chiefly palaces, are of great splendour. Among the oldest hitherto excavated is the North-west Palace at Nimrud, built about 884 B.C. Their peculiar style of architecture is familiar from the discoveries of Layard and his successors at Nineveh.

Persian.—Persia possesses in the remarkable ruins of palaces at Persepolis and Susa, built in the 5th and 6th centuries B.C., remains which bear a close resemblance to those of Assyria. The constructional parts of these Persian buildings being chiefly of marble, where those of the Assyrians were of wood, have been much better preserved. French explorers have discovered at Susa, a portion of an ancient palace built of bricks faced with enamelled colours. Fergusson pointed out that the Greeks got their first idea of the Ionic capital from buildings in Assyria and Persia. Indeed, he considered that the earliest form of the Corinthian capital could likewise be traced to these sources.

Indian.—Examples of almost every kind of construction, both in wood and stone, are to be found in the various styles of this wonderful country. Until recent years, it was believed that the cave-temples of India were of a very early date, but it has now been ascertained that none of these go further back than the 6th or 7th century of our era. All other ancient monuments in India, with the exception of the topes or pillars erected by the powerful ruler Asoka, are of still more recent date.

Greek.—Ancient Greek architecture is almost wholly represented by temples and theatres, the remains of which are found not only in Greece itself, but in Southern Italy, Asia Minor, and certain districts in North Africa. Some of these, as their ruins show—notably the temple of Diana at Ephesus—were originally of great size; and their architecture, even in its minutest details, is of a very refined character. The Grecian style embraces three orders, called the Doric, the Ionic, and the Corinthian. The most marked, though not the only distinguishing feature in these, is the capital of the column. The architecture of ancient Greece flourished from 650 to 324 B.C.

Roman.—The Romans borrowed their early architecture from that of Greece and Etruria, but about Roman buildings erected much before the Christian era very little is known. In Egypt, Assyria, Greece, and Etruria, architecture was chiefly confined to tombs, temples, palaces, or theatres. The Romans, however, applied it to many other purposes, such as basilicas, baths, bridges, aqueducts, triumphal arches, and domestic buildings. The circular and pointed arch, though known to earlier nations, seems to have been first used as a conspicuous feature by the Etruscans, whose buildings were chiefly tombs and city-walls and gates. From them the Romans borrowed the round arch, and put it to both a constructive and an ornamental use in almost all their buildings. They soon advanced a step further, and applied it as a vault in rectangular and circular edifices. By the Romans, the Grecian orders were modified in their proportions and details, and two others were added—namely, the Tuscan (a variety of the Roman Doric) and the Composite. In many of their buildings, such as the Colosseum, built 80 A.D. (see AMPHITHEATRE), the orders are piled over each other, dividing the great height of the external wall into several tiers or stories. Besides the Colosseum, the Pantheon, the Theatre of Marcellus, and the remains of temples, baths with their great vaulted halls, triumphal arches, and other monuments, still survive as examples of ancient architecture in Rome itself, built between the time of Augustus in the last century B.C., and that of Constantine in the 4th century A.D. At Pompeii, there are interesting examples of the domestic architecture of the 1st century of our era. Many important ancient Roman remains are likewise found not only in Italy, but in other countries subject to the empire in Europe, Asia, and Africa.

Byzantine.—With the establishment of Byzantium as the capital of the empire, the Roman style of architecture was naturally much practised there, and in particular the development of the dome became from the first a chief object with the eastern architects. Christians were first allowed to erect places of worship in the reign of Constantine the Great. The old basilicas, or courts of justice, were then turned into churches, for which they were well suited. Professor Baldwin Brown, of Edinburgh, has attempted to prove that the humbler *schola*, or hall of meeting, such as was used by the early Christians, as well as by heathen clubs and associations, rather than the basilica, was the original form of the Christian church. The name Byzantine is, strictly speaking, only applicable to the Christian architecture of Eastern Europe and Asia Minor, erected from the reign of Justinian to the 11th century; but the style continued in use, in a less pure form, till the Mohammedans subdued the Christian countries of the East. One of the finest buildings in this style is the church of St Sophia at Constantinople, founded by Constantine, but rebuilt by Justinian in 547 A.D. The cathedral of San Vitale at Ravenna, also erected in the 6th century, and St Mark's at Venice, built by architects from Constantinople in the 10th century, are two of the most perfect and interesting Byzantine churches in Italy.

Romanesque is the general term applied to all the various round-arched styles which arose in Western Europe, after the irruptions of the barbarians had ceased. It was founded partly on the Roman remains existing in different countries, and also, to a large extent, on the influence of the still flourishing Byzantine art on the awakening communities of the West.—*Teutonic Romanesque* may be regarded as synonymous with Rhenish architecture. The cathedrals of Speier, Mainz, and Worms are examples.—*Lombard Architecture*, the form of Romanesque practised in Lombardy. Examples of it are to be seen in St Ambrogio at Milan, St Abondio at Como, and the cathedrals of Parma and Piacenza. The Romanesque styles of Lombardy and countries north of the Alps, including the Norman of France and England, prevailed during the 11th and 12th centuries.

Saxon or Pre-Norman.—The Norman style would link on more naturally than this with the Teutonic Romanesque. But the Saxon is prior in point of date, and is the earliest of our native styles. It is simple, and has, as a rule, coarsely dressed masonry. The 'long and short work' of the corners and other parts are very probably imitations of woodwork. In whole or in part, the churches of Bradford (Wilts), Earl's Barton, Worth, Monkwearmouth, and other places in England; and perhaps that of St Regulus at St Andrews, in Scotland, are pre-Norman. But there are some curious problems still to solve about these buildings erected prior to the Norman Conquest.

Norman.—This style is also sometimes called Romanesque. No kind of architecture is better known in England and Scotland than the Norman, owing to the abundance of examples which remain. It is characterised by round-headed openings, by flat buttresses like pilasters, by 'cubical' masonry, and by the richness and quaintness of the carving, especially on many of the doorways and chancel arches of even the smaller churches. In the cathedrals and large churches the pillars dividing the aisles from the nave are very massive. Among the many examples in England may be mentioned the cathedrals of Durham, Canterbury, Peterborough, and parts of Lincoln and Winchester. In Scotland, Kirkwall Cathedral is the most complete example on a large scale; but the abbeys of Dunfermline, Kelso, and Jedburgh are also fine, though fragmentary. The small churches of Dalmeny and Leuchars have rich carving.

Under the general term *Gothic Architecture* (q.v.) some writers include the Norman style. More usually, however, the name Gothic is understood to mean the pointed styles of architecture, which succeeded the Romanesque and Norman.

Early English or *First Pointed Style.*—As soon as the transition from the Norman to first pointed architecture was complete, the latter was characterised by its narrow pointed or 'lancet' windows, without any, or with only very simple, tracery. Further distinguishing features are high gables and roofs, and simple pinnacles and spires. Buttresses are deep instead of shallow, as in the Norman,

and shafts slender, whether they are simple or clustered. The capital is bell-shaped, either with plain mouldings or with bold and graceful foliage, and the Abacus (q.v.) in this country is round instead of square. The mouldings consist of projecting rounds and deep retiring hollows, which give strong light and shade. In England, Salisbury Cathedral is wholly in this style, so also are the nave and transepts of Westminster Abbey. Scotland has good examples of it in the choir of Glasgow, and in most of what remains of Elgin Cathedral. This style lasted from towards the end of the 12th to near the end of the 13th century.

Transition.—At the former date a change is observable in the window-tracery, the foliage, &c., indicating that the style is gradually altering or undergoing a transition to the

Decorated, Second Pointed, or *Middle Pointed Style.*—Windows are now divided into a number of lights by comparatively thin mullions, and their upper portions filled with beautiful tracery, which at first was of geometrical forms, such as combinations of circles, trefoils, and quatrefoils. But in the later period of the style, the tracery becomes wavy and flowing, and of almost endless variety. Ordinary buttresses are more enriched than in the earlier style, and flying-buttresses, though not for the first time used, are now common. A continuation of the arch-mouldings, instead of shafts with caps, at length characterises the jambs of the doorways. All the smaller ornaments and foliage are rich, free, and graceful. This is generally considered the most perfect and beautiful style of Gothic architecture. As examples of it, may be mentioned the choir of Lincoln and the nave of York Cathedral; and in Scotland portions of Melrose Abbey. The style continued from about 1274 to 1377. It then gradually stiffened into what is called the

Perpendicular, Third Pointed, or *Late Pointed Style.*—This is easily distinguished from the previous style by the tracery of the windows, which is characterised by an upright and square tendency. Perpendicular lines prevail in the windows as well as in the ornamental panelling. The doorways have square heads over pointed arches. Gables and roofs are at a low angle. Clerestory windows are more frequently square-headed than arched. It is only in this style that we find the depressed four-centred or Tudor arch, although arches with two centres are also used. Rich Fan-tracery (q.v.) appears in the vaulting, and ornamented open timber roofs are frequent (see ROOF). The perpendicular style is not represented in continental Gothic buildings. Westminster Hall, London, is an early example of this style. Henry VII.'s Chapel, Westminster Abbey, has beautiful fan-tracery. Somersetshire is peculiarly rich in churches of this period. In Scotland, the great east window of Melrose Abbey is a good example. The style prevailed from the end of the 14th to the middle of the 16th century. The later portion of this period is sometimes called the *Tudor* style. The elaborately ornamented *Flamboyant* (q.v.) style was the latest style of Gothic in France (15th and 16th centuries). The Municipal Architecture (q.v.) of the middle ages was largely Gothic in type.

Under the head GOTHIC ARCHITECTURE will be found some account of buildings belonging to the different periods of pointed architecture on the Continent.

Roman or classic architecture may be said to have never entirely died out in Rome, and when, in the 15th century, the revival of classic literature and taste took place, the ancient classic style of architecture naturally revived along with them. This is called the *Italian Renaissance.* Buildings, many of which are famous, erected at Rome, Florence, Venice, and other places in Italy, from the beginning of the 15th to the end of the 17th century, and some would say even later, are included under the general term Italian architecture. The name Renaissance is likewise given to it, but this term is also applied to architectural works erected in other parts of Europe after the decay of Gothic architecture in the 16th century; and in a wide sense it includes all edifices built in a classical (but not when of a purely Greek) style from that time to our own. It comprises so many diversities that it is hardly possible to define it with any kind of precision. Renaissance as applied to architecture means a revival of classical features and details as distinguished from those which characterise the Gothic. St Peter's at Rome; the Pitti Palace at Florence; various palaces on the grand canal at Venice; the Louvre and Tuileries at Paris; the Banqueting House in Whitehall, and St Paul's Cathedral, London, are all examples of Renaissance.

Elizabethan Architecture (q.v.), and the corresponding style on the Continent, is a variety of Renaissance, in which Gothic and Italian features are somewhat mixed. Holland House, near London, as well as Hatfield House, Burleigh House, and Hardwick Hall, in other parts of England, are well-known buildings in this style; so also is Heriot's Hospital at Edinburgh.

Arabian, Saracenic, or *Moorish.*—This singular and beautiful style of architecture appears to have first taken a definite character in the 9th century, and was probably based on Persian, together with some of the elements of Roman and Byzantine art. The style is noted for its elegant domes, often with remarkable external decoration; for its graceful minarets or towers, lessening in diameter stage by stage as they rise; for the frequent use of the pointed arch, and of the horseshoe arch; and in some cases for the peculiarly slender columns which support the walls above them. The flat or surface decorations are peculiarly striking and effective. These consist of diaper-work, often richly perforated; and of scroll-work of great variety, often of fairy-like lightness. The stalactitic-looking pendentives, filling up such places as the corners of ceilings, have a remarkably fine effect. Several mosques and other buildings at Cairo, a peculiar class of houses in Algiers, and the Moorish palace of the Alhambra, as well as the mosque of Córdoba, in Spain, furnish striking illustrations of this kind of architecture.

Modern Architecture.—This title is generally applied to the architecture which has been used by European nations since the time of the Renaissance. The Renaissance, as we have seen, was a revival of Roman architecture, the study of which naturally led to an acquaintance with its prototype, the architecture of Greece. The examination of Grecian buildings, and the revival of their style, was much encouraged in the 18th century. In the beginning of the 19th century, the habit of imitating ancient styles had been established, and began to be applied to Gothic architecture also, which speedily came to be generally adopted, especially for ecclesiastical edifices. This has been particularly the case in Great Britain, and amongst the Anglo-Saxon race wherever found—in America, India, and Australia, as well as at home. All modern architecture is imitative, and it is doubtful whether a really new style is possible. At present Gothic is generally adopted for churches, and Renaissance for domestic buildings. The Houses of Parliament at Westminster are one great example of an attempt to apply Gothic to a secular building, and the Law Courts erected in London in 1868-82 are another. In France, the birthplace

of Gothic, it is little practised, the French having adopted a special modification of the Renaissance, which is known as the 'French style.' Most of the great modern towns, such as Paris, Lyons, and Marseilles, have been largely rebuilt in this style. In Germany and Italy the purer classic examples have been more frequently followed; but of late there is a strong tendency towards Renaissance, as practised during the 16th and 17th centuries, in Germany, Britain, and America.

See the *Dictionary* of the Architectural Publication Society; the works of Pugin, Viollet le Duc, Parker, Fergusson, Freeman, Fletcher (1928), Statham (1909–13), F. M. Simpson (1905–12), Lethaby, Sturgis and Frothingham (1907 *et seq.*), Rivoira, Moore, Bond, Jackson.

Each of the principal styles receives separate treatment at its own alphabetical place (Greek, Roman, Byzantine, Arabian, Romanesque, Norman, Gothic, Early English, Perpendicular, Renaissance, &c.); or in the articles on the several countries (Assyria, Babylonia, Egypt, Persia, India, China, Japan). Many important architectural monuments are described and figured in separate articles (Pantheon, Pyramids, Stonehenge, Teocalli, &c.), or in the articles on the places where they are found (Agra, Baalbek, Benares, Edfu, Florence, London, Palmyra, Paris, Persepolis, Philæ, Rome, Salisbury, Thebes, Venice, &c.). See also the articles on the great architects (Michelangelo, Inigo Jones, Christopher Wren, &c.). Other articles on architectural subjects are:

Aisle.	Cloister.	Monastery.
Alhambra.	Column.	Mouldings.
Apse.	Cornice.	Obelisk.
Aqueduct.	Crockets.	Pagoda.
Arch.	Crypt.	Pews.
Art.	Cusps.	Pillar.
Baptistery.	Cyclopean	Piscina.
Basilica.	Diaper.	Porch.
Bay-window.	Domestic Archit.	Quatrefoil.
Belfry.	Door.	Reredos.
Building.	Ellora.	Restoration.
Buttress.	Entablature.	Rococo.
Campanile.	Fan-tracery.	Rood-screen.
Canopy.	Finial.	Round Towers.
Castle.	Flamboyant.	Spire.
Chapter-house.	Font.	Temple.
Chimney.	Galilee.	Tiles.
Church.	Gargoyle.	Tooth-ornament.
Cinquefoil.	Glass (Painted).	Window.

Architrave. See ENTABLATURE.

Archives. See RECORDS.

Ar'chon, the highest magistrate in Athens. The government was originally monarchical; but on the death of Codrus (q.v.), the Athenians, according to the traditionary account, resolved that no one should succeed him with the title of king (*basileus*), and therefore appointed his son Medon with the title of *archōn* (ruler). The office was at first for life, and confined to the family of Medon; but in 753 B.C., it is said, the term was limited to ten years; and in 714 the exclusive claims of Medon's family to the office were abrogated. It was open to the two highest classes only till 457, when the Zeugitai were admitted. In 683 the office had been made annual, and the number of archons had been extended to nine. The first archon was styled *Epōnymos*, and from him the year was named; to the second, styled *Basileus*, belonged the care of religious affairs; the third was *Polemarchos*, or commander-in-chief; and the remaining six, having to conduct all criminal trials, were styled *Thesmothetai*, or lawgivers. Appointment by lot from 487 shows that the archonship had lost its importance.

Archpriest, a superior appointed by the pope to govern the secular priests sent into England from the foreign seminaries during the period 1598–1621. On the death of Cardinal Allen, in 1594, the missionary priests were left without a head. Dissensions had already sprung up between the secular clergy and the Jesuits. The need of some superior was evident. Some wished for the ordinary government of bishops. The Jesuits desired to keep the control of affairs in their own hands. Through the influence of Father Parsons, Clement VIII. commissioned Cardinal Cajetan, called the Protector of England, to appoint George Blackwell archpriest, with jurisdiction over the secular clergy of both England and Scotland (March 1598). The archpriest was to have twelve assistants, but among other instructions given to him was an order that in all matters of importance he should consult the superior of the Jesuits in England, at that time Father Garnet. It is said that Parsons's object in thus placing the direction of British Catholics in the hands of one man subservient to the Jesuits, was the better to further the political projects of his own or the Spanish party in view of the succession to the crown. The leading secular clergy protested against the novel appointment as irregular in its institution, made upon false and fraudulent information, and oppressive in its action. They finally (November 1600) drew up a formal appeal, signed by thirty-three priests, and, secretly aided by the queen and council, sent four of their number to represent their cause at Rome. Some of the grievances complained of were at length redressed, and the archpriest's abuse of power and the influence of the Jesuits controlled, but the form of government was retained. Blackwell was deprived in 1608 for taking, and persuading others to take, the oath of allegiance, which had been condemned by Urban V. He died in a London prison five years afterwards.

George Birket or Birkhead, who was appointed in Blackwell's place in 1608, died in 1614. The third and last archpriest was Dr William Harrison, who ruled the clergy in this capacity till his death in 1621. Harrison had himself urged upon Rome the appointment of bishops, while the Jesuits in their turn now sought the aid of the government in opposing it. In 1623 William Bishop, the chief antagonist of Blackwell, and a leader of the appellants, was made titular Bishop of Chalcedon, and vicar-apostolic of England and Scotland.

See *Jesuits and Seculars in the Reign of Elizabeth* (1889), and *The Archpriest Controversy* (1899), both by Dr T. Graves Law.

Archy'tas OF TARENTUM, who flourished about 400 B.C., was seven times elected general, and was victorious in every campaign. His civil administration was equally fortunate; and he was no less distinguished as a mathematician and philosopher. His virtues were as conspicuous as his talents; he was unselfish, moderate, and humane; and although one of the greatest geometricians, he did not disdain to make toys for his children. He solved the problem of the doubling of the cube, and secured almost the reputation of a magician by his numerous mechanical contrivances, the most wonderful of which was the flying pigeon. A Pythagorean in philosophy, he is supposed to have exerted an influence on Plato, and some affirm that Aristotle was indebted to him for the idea of his categories. Only unimportant fragments of his writings remain. They relate to metaphysics, ethics, logic, and physics. Horace says he was drowned in the Adriatic.

Arcis-sur-Aube, a town of 3000 inhabitants in the French department of Aube, on the navigable Aube, 22 miles N. of Troyes by rail. It was the birthplace of Danton, and near it a battle was fought, March 20–21, 1814, between Napoleon and the allied forces under Prince Schwarzenberg, ending in a French retreat.

Ar'cola (French *Arcole*), a village on the left bank of the Adige, 15 miles ESE. of Verona, famous for the victory gained by Napoleon over the Austrians, 15th to 17th November 1796.

Arcos de la Fronte'ra, a town on the right bank of the Guadalete, in the Spanish province

of Cádiz, 20 miles ENE. of Xeres. It has a romantic situation, on a rocky hill, and was called *de la Frontera*, from its having stood on the frontiers of the old Moorish kingdom of Granada. Almost impregnable by nature, it was furthermore embattled with walls and towers, part of which still remain. It manufactures leather, hats, and articles made of esparto grass; and produces wine, oil, and fruit. Pop. (1920) 15,748.

Arcot (*Aru-Kadu*, 'six deserts'), a city of British India, in the presidency of Madras. It is situated on the right bank of the Palar, 2 miles from Ranipet railway station, and 65 WSW. of Madras. Besides the military cantonment, which can accommodate three regiments of cavalry, Arcot contains some mosques in a tolerable state of repair, and the ruins of the Nawab's palace. In 1751 Clive, with 300 Sepoys and 200 Europeans, marched against Arcot, which was garrisoned by 1100 men; and after having taken it, had in his turn to withstand a siege of fifty days. Arcot was afterwards captured by the French, but retaken by Colonel Coote in 1760. It was taken and held for a time by Hyder Ali, but passed into the hands of the British in 1801. Pop. (1921) 11,450.

The districts of NORTH and SOUTH ARCOT, especially North Arcot, are dependent on tanks in the dry season, and have suffered severely from famines. Area of North Arcot (as reduced in 1909), 4920 sq. m.; pop. (1921) 2,055,594; area of South Arcot (as reduced in 1909), 4208 sq. m.; pop. (1921) 2,320,265.

Arctic means, properly, lying near the constellation of the Bear (Gr. *arktos*) or Ursa Major (q.v.), and hence, northern. The Arctic Circle is a circle drawn round the North Pole, at a distance from it equal to the obliquity of the ecliptic, or 23½°. The corresponding circle round the South Pole is the Antarctic Circle. Within each of these circles there is a period of the year when the sun does not set, and another when he is never seen, this latter period being longer the nearer to the pole. The word is also used figuratively to express extreme cold.

Arctic Animals. The region north of the cultivation of cereals is peopled by a limited and homogeneous fauna. Mammals are represented almost exclusively by ruminants, carnivores, and rodents, such as the Arctic fox, polar bear, glutton, ermine, sable, walrus, tail-less hare, lemming, reindeer, and musk-ox. Birds are represented especially by the snow-partridges, snowy owl, Iceland falcon, eider-duck, auks, divers, and guillemots. No reptiles can live in the cold of the arctic regions; but fishes, especially Salmonidæ, are well represented. Insects and molluscs are fairly numerous. Not a few of the birds and mammals inhabiting these snowy regions exhibit adaptive characters of white colour, thick coats, accumulations of fat, and the like. See GEOGRAPHICAL DISTRIBUTION; Pennant's *Arctic Zoology;* Heilprin's *Distribution of Animals* (1887); and the observations of Nordenskiöld, Nansen, Peary, &c.

Arctic Ocean. The Arctic Ocean lies to the north of Europe, Asia, and North America, and surrounds the North Pole; it is usually defined as the water area within the Arctic Circle. The influence of the Gulf Stream, however, carries a relatively mild climate a long way within the Arctic Circle off the coasts of Norway; and, on the other hand, the Arctic currents along the east coast of Greenland, and through Davis Strait, bring down Arctic conditions a long distance into the Atlantic. Physiographically, the Norwegian Sea and Greenland Sea, situated between Norway and Greenland, belong to the same basin as the Arctic Ocean, which is cut off from the Atlantic by the ridges stretching between Greenland, Iceland, the Faeroe Islands, and the north of Scotland—these having an average depth over them of 240 fathoms. If the Arctic Ocean be regarded as lying wholly within the Arctic Circle, then it is almost landlocked between that circle and the parallel of 70° N. It communicates with the Pacific by Behring Strait, and with the Atlantic through Davis Strait and the wide sea between Norway and Greenland. The area of the ocean is about 5,000,000 sq. m., and into it there drain about 8,660,000 sq. m. of land. The rainfall on this land is estimated at 2100 cubic miles per annum. The coasts of Europe and Asia are low, and have several deep indentations, the principal being the White Sea and the Gulf of Obi. The shores of North America are skirted by a most irregular assemblage of islands, forming numerous gulfs, bays, and channels. The principal islands of the Arctic Ocean are Greenland, Spitsbergen, Franz-Josef Land, Novaya Zemlya, New Siberia, Wrangel Island, Prince Patrick Island, Melville Island, Banks Land, Ellesmere Land, Grinnell Land, &c. In 1913 a Russian expedition under Vilkitsky discovered Nicholas II. Land (re-named Severnaya Zemlya 'North Land'), north of Cape Chelyuskin, stretching some 200 miles up to 81° N., 96° E. The principal rivers from Asia are the Lena, Yenesei, and Obi; from Europe, the Onega, Dwina, and Petchora; from America, the Mackenzie. The Arctic highlands are covered with an enormous depth of snow and ice. In some places this results in the formation of great glaciers, one of the most remarkable of which is the Humboldt Glacier, in 79° N. lat., on the west coast of Greenland. The whole ocean is covered by immense ice-fields from 5 to 50 feet in thickness. During winter these are bound together by the severe frost, but these continuous masses break up during the summer months into floes and floe-bergs. Sometimes vast spaces of water and long lanes are formed between the floes and ice-fields, and these have, doubtless, given rise to the notions regarding an open Polar Sea which at one time prevailed. When these great floating ice-fields come together, the margins where they collide are piled up on each other, and thus the well-known hummocky ice-floes are produced. When this hummocky ice is jammed against a shallow shore, and becomes fixed for long periods of time, the appearances are produced to which Nares gave the name of 'Palæocrystic Sea.' In the more open parts of the ocean the ice is, however, always in motion. Immense quantities of field and hummocky ice pass down each year between Spitsbergen and Greenland, and Greenland and Iceland, these waters being almost always blocked. Frozen in this ice, whole pine-trees are not uncommonly found; these have most probably been carried right across the pole, after having been carried into the Arctic Ocean by the rivers of the Old and New World. Large fresh-water ponds and lakes are formed on the ice-fields during summer by the rain and melting snow. When these are frozen again, a 'black ice' is formed, which contrasts strongly with the 'white ice' formed from salt water. The whalers supply themselves with water by picking up the 'black ice.' Parry found, as he travelled over the ice north of Spitsbergen, that it was moving in a body to the south. He reached a latitude of 82° 45′, Markham reached 83° 20′, Lockwood (1882) 83° 24′, Nansen (1895) 86° 14′, Cagni (1900) 86° 33′, and Peary (1909) the Pole. In 1850 M'Clure entered Behring Strait, and brought his crew home by Davis Strait, thus discovering the *North-west Passage.* In 1878 and 1879 Nordenskiöld sailed from the Atlantic to the Pacific along the northern shores of Europe and Asia, thus discovering the *North-east Passage.*

Nansen (q.v.) found that the depth suddenly increased north of the New Siberian islands from 100 fathoms to 1800 or 2000; below the cold layer of 200 fathoms the water was warmer by as much as 2·4° C. than at the surface (−1·6° C. and +0·8° C.). The pole is probably in deep water. Cold Arctic water penetrates the Faeroe Channel, but is stopped by the Wyville-Thomson Ridge; on the north of this ridge there is, at a depth of 400 and 500 fathoms, a temperature of 30° F.; while on the south side, at the same depths, the temperature is 45° F. The width of this ridge is about 10 miles, and on it there is a depth of 250 fathoms. The warm Gulf Stream water flows over this ridge and on to the coasts of Norway, rendering its northern shores and those of Lapland relatively mild and habitable, the July temperature off the North Cape being 47° F. Musk-oxen, reindeer, foxes, hares, and wolves are met with on Arctic land. Polar bears roam widely over the ice-fields. Whales, walruses, narwhals, and seals abound. Guillemots, little auks, gulls, and other sea-birds are found in vast numbers near Spitsbergen and other islands. Eider-ducks nest on the low lands. There is a great amount of invertebrate life at the surface of the sea, and diatoms are also abundant. The Norwegian expeditions show that life exists at great depths, but it is by no means so abundant as in the Antarctic. The ocean appears to be shallow to the north of Europe and Asia, the depth 500 miles to the north of the Lena being only 38 fathoms; and Markham found only 72 fathoms at his most northerly point off the American coast. Between Spitsbergen and Lapland the depths are from 100 to 200 fathoms; but between Spitsbergen and the north of Greenland there is a deep opening into the frozen sea, where the depth is 2500 fathoms. Between Norway and Greenland the depths in some places are over 2000 fathoms, and generally over 1000 fathoms in the central parts. The depths in Behring Strait are less than 100 fathoms. The deposits in the Arctic Ocean are blue muds, composed almost wholly of land débris. In the south-east portions of the Norwegian Sea, some of the deposits approach in character to a globigerina ooze. South-westerly winds prevail along the coasts of Norway, and as far as Franz Josef Land; to the westward of this line north-easterly winds prevail. In winter winds blow from Northern Asia to the Arctic Ocean; in summer, from the ocean to the land. The direction of the winds over the Arctic Ocean at different seasons is controlled by the positions of the barometric maxima and minima in the north parts of Asia and the North Atlantic. Fogs and mists are of most frequent occurrence during the six months of day and summer. In winter the temperature of the air is sometimes as low as −47° F., and in summer is usually a little above the freezing-point. The absence of large flat-topped tabular icebergs, like those of the Antarctic, is adduced as evidence that there is no expanse of land towards the Pole; but Dr R. A. Harris argues from the tides, &c., that an Arctic continent of 500,000 sq. miles lies in the unexplored Beaufort Sea between the Behring Strait and the Pole; and Peary thought he sighted Crocker Land in this region; but airmen have seen no land. See also POLAR EXPLORATION.

Arctium. See BURDOCK.

Ar'ctomys. See MARMOT.

Arctostaphylos. See BEAR-BERRY, MANZANITA.

Ar'cus Seni'lis (Lat., 'the bow of old age'), a narrow white or yellowish band close to, but within the margin of the cornea (see EYE), caused by fatty degeneration of its tissue. It usually begins during middle life, first at the upper, then at the lower part of the cornea; before old age is reached, these two arcs have generally united at the sides to form a ring. It is frequently associated with Atheroma (see ARTERIES, *Diseases of*), but it is of no other practical importance.

Ard, or AIRD, a Celtic root, meaning 'height' (cf. Lat. *arduus*, 'high'), found in many geographical names, especially in Ireland and Scotland.

Ardahan, a village in Turkish Armenia, 35 miles NW. of Kars. Its position gives it strategic importance. Its fortress was dismantled by the Russians in the war of 1854–56; in 1878 the Berlin Congress sanctioned the cession to Russia of Ardahan, which had been captured early in the war. The Russians gained an important victory over the Turks concentrated here on 3d January 1915. It was ceded again to Turkey in 1921. On account of the severity of the climate, the houses of Ardahan are mainly constructed underground.

Ardalân, a region in the west of Persia, embracing the basin of the Shirwan Rúd. It is generally mountainous, but the valleys are very fertile, and if well watered, yield cereals and fruits in abundance.

Ardea. See HERON.

Ardebil, a town of Persia, in the province of Azerbaijan, 110 miles E. of Tabriz, and some 5000 feet above the sea. Pop. about 10,000.

Ardèche, a department in the south of France, takes its name from a tributary of the Rhone, and includes part of ancient Languedoc. It is almost wholly mountainous. In the NW. of the department, the Cevennes culminate in the volcanic Mont-Mézenc, 5752 feet in height. Numerous extinct volcanic peaks, deep craters, grottos, rock-labyrinths, and basaltic columns give an extraordinarily picturesque appearance to the scenery. The upland, where winter reigns for six or eight months, is devoted to pasturage; but the valley of the Rhone produces wine, olives, chestnuts, figs, and almonds. Only a fourth of the area is cultivated. Iron, coal, antimony, lead, marble, and gypsum are wrought. There are manufactures of silk, paper, leather, woollens, gloves, straw. Area, 2144 sq. m.; pop. (1926) 289,263. The capital is Privas.

Ardee', a town in the west of County Louth, Ireland, on the river Dee, 12 miles inland. The ancient castle, built about the year 1200, is now used as the town-house; there is a handsome convent here. Pop. (1926) 1730.

Ardennes, an extensive hill-country and forest, occupying the SE. corner of Belgium, between the Moselle and the Meuse, but extending also into France and Rhenish Prussia. It consists of a broken mass of hills, for the most part of no great elevation, which gradually slope towards the plains of Flanders. The average height of the hills is less than 1600 feet; but in the east, they attain an elevation of about 2100 feet. Large tracts of this region consist not of hills, but of gently undulating plateaus, in some districts densely covered with oak and beech forests, but for the most part heathy, marshy, and barren. The channel of the Meuse is in some places bound in by rugged and precipitous cliffs more than 600 feet high. The principal rocks of the Ardennes are clay-slate, graywacke, quartz rock, and various metamorphic rocks; besides which occur in various places extensive outcrops of crystalline limestone. The wealth of the region is its wood and its minerals. Enormous supplies of coal are found in the north, a very important element in Belgium's industrial wealth; iron, lead, antimony, copper, and manganese are also found. Multitudes of cattle and sheep are reared. The *Arduenna Silva* of the Romans extended over a still wider area.

The 'Wild Boar of the Ardennes' was William de la Marck, Lord of Amblève near Spa, a robber-noble of Louis XI.'s time who figures in *Quentin Durward*.—Shakespeare's Forest of Arden is a district in Warwickshire, between the Avon and Birmingham.

Ardennes, a department of France on the Belgian frontier, named from the forest, formed part of Champagne; area, 2030 sq. m. The NE. belongs to the basin of the Meuse; the SW. is watered by the Aisne. About two-fifths of the whole surface is hilly, and covered with forests and wide tracts of pasturage. In the north, marble is obtained; but the prevailing rock is limestone. South of this, and stretching across the department from east to west, are great layers of slate. Only the valleys are fertile, and produce corn. The vine is cultivated in the SW. Cattle and sheep are reared. Slate, marble, iron, clay, copper, and coal are found. Iron-working is largely carried on, and woollen cloth is woven, especially in Sedan. There are also manufactures of clay-pipes, glass, paper, sugar, and beer. The capital is Mézières. The largest towns are Charleville and Sedan. Pop. (1886) 332,759; (1911) 318,896; (1926) 297,448.

Arditi, Luigi (1822-1903), musician and composer, born in Piedmont, studied music at the Conservatoire of Milan. Famous first as a violinist, then as a conductor, he came to London in 1857, and from that year till 1878 was musical director at Her Majesty's Theatre. He conducted Italian opera and concerts in places as remote from one another as New York and Constantinople; published the operas *I Briganti* (1841) and *La Spia* (1856); and is known as author of much popular music—songs, violin duets, and waltzes such as *Il Bacio*. His Reminiscences were edited by Baroness von Zedlitz (1896).

Ardnamur'chan Point, a rugged headland of Argyllshire, the most westerly point of the mainland of Britain. A castle-like lighthouse was built here in 1849.

Ar'doch, a place in Perthshire, 12 miles NNE. of Stirling, celebrated for a Roman camp, the most entire in Britain. The intrenched works form a rectangle 500 by 430 feet, the four sides facing the cardinal points. The north and east sides are protected by five deep ditches and six ramparts, these works being 270 feet broad on the north side, and 180 feet on the east. A deep morass exists on the SE., and the perpendicular banks of Knaik Water, rising 50 feet high, protect the camp on the west. The prætorium, or general's quarters, now called Chapel Hill, rises above the level of the camp, but is not exactly in the centre, and is nearly a square of 60 feet each side. Three of the four gates usual in Roman camps are still seen. A subterranean passage is said to have formerly extended from the prætorium under the bed of the Knaik. Not far north of this station, on the way to Crieff, may be traced three temporary Roman camps of different sizes. Portions of the ramparts of these camps still exist.

Ardoye, a town of Belgium, in the province of West Flanders, 17 miles S. of Bruges. It has extensive cloth-weaving works. Pop. 7000.

Ardros'san, a seaport and watering-place in Ayrshire, 1 mile WNW. of Saltcoats, and 32 miles SW. of Glasgow by rail. It owes its rise to Hugh, Earl of Eglinton, who began the formation of the present town and harbour in 1806, and who planned magnificent works, and spent vast sums in striving to make this the port of Glasgow. Suspended in 1815, these works were resumed in 1833, and now the harbour, which is sheltered by an islet, is one of the safest and most accessible on the west coast of Scotland. A new dock was made in 1887–92. The chief exports are coal and pig-iron; the chief imports, timber, grain, limestone, and iron ore. On a hill above the town stands a fragment of Ardrossan Castle, said to have been surprised by Wallace, who slew its English garrison, and threw the dead bodies into a dungeon called 'Wallace's Larder.' Pop. 7000.

Are (Lat. *area*), the unit of the French land-measure, is a square, the side of which is 10 metres (or 32·809 feet) long (see Metre), and which therefore contains 100 square metres = 119·6 English square yards. The next denomination in the ascending scale is the *decare*, containing 10 ares; but the denomination commonly used in describing a quantity of land is the *hectare* of 100 ares, = 2·47 English statute or imperial acres.

Area (Lat.) is a term in mathematics meaning *quantity of surface*. The calculation of areas, or mensuration of surfaces, is one of the objects of geometry. The measuring unit is a square inch, a square foot, &c. according to the unit of length. As a figure is thus measured by finding an equivalent for its surface in *squares*, the process is sometimes called the *quadrature* of the figure. See Quadrature, Mensuration, Surveying.

Ar'eca, a genus of palm, with pinnate leaves and double spathes. The fruit is a nut with an outer fibrous husk. *A. Catechu*, the Penang Palm, or Betel-nut Palm, is a native of the East Indies, whose nut yields a sort of Catechu (q.v.). This Areca-nut, or Betel-nut, is very much used in many parts of the East, the chewing of it with quicklime and the leaf of the betel-pepper being one of the most prevalent habits of the people (see Betel). The nut is about the size of a hen's egg; the fibrous husk about half an inch thick. It is austere and astringent. It is doubtful if it possesses a narcotic power, or if this is to be ascribed entirely to the leaf which is used along with it. Areca-nuts form an article of trade in the East, are imported for tooth-powder and for dog-medicine (see the article Worms). The timber of the palm which produces them, and its leaf-stalks and spathes, are also used for domestic purposes. The tree is often 40 or 50 feet high, and in general less than a foot in diameter. The leaves are few, but very large, their leaflets more than a yard long. In Malabar, an inebriating lozenge is prepared from the sap. For *Oreodoxa* (otherwise *Areca*) *oleracea*, see Cabbage Palm.

Arecibo, a town on the north coast of the West Indian island of Porto Rico, 30 miles by rail W. of San Juan; pop. 10,000.

Are'na, the part of an amphitheatre where the combats of gladiators and wild beasts took place. It was so called because it was usually strewed with sand (Lat. *arena*).

Arenaceous Rocks. All rocks composed entirely, or to a large extent, of grains of quartz are included under this title. Beds of loose sand occur extensively in the more recent deposits. The grains, either of quartz or flint, are generally water-worn and rounded; in some cases, however, they are more or less angular, or rounded and angular grains occur commingled. In older deposits, the grains of sand are bound together by siliceous, calcareous, argillaceous, or ferruginous cements. It is seldom that a rock is composed of quartzose materials alone; grains or particles of other mineral substances are frequently mingled with the grains of quartz. Silvery flakes of mica are seldom absent; and they often occur in layers parallel to the planes of stratification, causing the rock to split into thin slabs, and exposing a glitter-

ing surface. These are called *micaceous sandstones.* When grains of felspar occur, it is a *felspathic sandstone.* Often large quantities of calcareous matter, either as cement or as distinct grains, occur; and these are called *calcareous sandstones.* In like manner we have *siliceous* and *ferruginous sandstones,* when silica and oxide of iron are conspicuously present as cementing or binding materials. Clay and carbonaceous matter, when plentifully diffused through the rock, give rise to *argillaceous, carbonaceous,* and *bituminous sandstones. Greensand,* or *glauconitic sandstone,* is a rock containing abundant grains of the dirty greenish mineral called glauconite. *Arkose* is a sandstone composed of disintegrated granite; *volcanic sandstone, trappean sandstone,* &c. being composed of disintegrated igneous rocks. The presence of lime can always be detected by the effervescence which takes place on the application of hydrochloric or other acid. A sandstone of homogeneous composition, which may be worked freely in any direction, is called *freestone* or *liver-rock. Flagstone* is a sandstone which is capable of being split into thin beds or flags along the planes of deposition. When the sandstone is coarse-grained, it is usually called *grit.* If it contain, more or less abundantly, grains large enough to be called pebbles, the sandstone is said to be *conglomeratic;* and if the pebbles or stones be angular, the rock is described as a *brecciated sandstone.* Coarse-grained *grits* and *pebbly* or *conglomeratic sandstones* pass into *conglomerate* or *puddingstone,* which consists of a mass of various-sized water-worn stones. *Brecciated sandstones* frequently pass into *breccia,* which is an aggregate of angular and subangular fragments. *Graywacke* is a dark-gray or grayish-blue sandstone, more or less altered or metamorphosed, met with among Palæozoic formations.

Arenaria. See SANDWORT.

Arenberg (*Aremberg*), from 1644 till 1820 a small sovereign duchy of Germany, lying between Jülich and Cologne; now part of the district of Coblenz, Rheinland.

Ar'endal, a coast-town in the south-east of Norway, situated near the mouth of the Nidelf in the bay of Christiania. It is built partly on piles, partly on rock, and has been called 'Little Venice,' on account both of its picturesque appearance and of the canals which intersect it. The bay, which is protected by the island of Tromö, forms an excellent harbour, and favours the commerce of the town, which includes large exports of iron and timber. Pop. 10,000.

Arends, LEOPOLD, founder of a widely popular system of stenography, was born at Rakishy, near Wilna, 1st December 1817. Educated at Dorpat, in 1844 he settled in Berlin, where he died 22d December 1882. He wrote dramas, as well as books on popular natural history and ancient Hebrew music, but his name is best known through his 'rational stenography,' first published fully in 1860 in his *Vollständiger Leitfaden.*

Arenga, an East Indian genus of palms. *A. saccharifera,* widely distributed in Malaya, yields sugar, palm-wine, thatch, and a sort of sago.

Arenicola. See SANDWORM.

Arenig. See SILURIAN SYSTEM.

Arensky, ANTON STEPANOVICH, Russian composer, born 30th July 1861 at Novgorod, taught from 1883 in the Moscow Conservatorium, and from 1895 conducted the court choir at St Petersburg. He died 25th February 1906. His works include operas, two symphonies, a piano concerto and chamber music. He wrote on harmony.

Areometer, an instrument for determining specific gravity, called also the Hydrometer (q.v.).

Areop'agus, a small hill in Athens, and a court which met there. See ATHENS; also DIONYSIUS THE AREOPAGITE, MILTON.

Arequi'pa, a term applied primarily to a mountain in the west Cordillera of the Peruvian Andes, as also to a city at its foot, and to the southern department of Peru, which contains them both. The mountain, also called Misti, is volcanic, of the form of a truncated cone; it sometimes smokes, and has a height of 19,000 feet. Its neighbourhood is subject to earthquakes. The city, in a rich valley, 7700 feet above the sea, is the third largest in Peru, being inferior only to Lima and Callao, and contains about 35,000 inhabitants. It carries on a considerable trade in llama wool, gold, &c. with the interior and by sea. Harvard University has an observatory near by. A remarkable railway runs *viâ* Arequipa from the port of Mollendo across the Andes to Lake Titicaca, Cuzco, and Bolivia. This neighbourhood is fruitful and well cultivated. The department adjoins Moquegua, the most southerly region of Peru. It has an area of 22,000 sq. m., and a population of 229,000. As in nearly the whole of the maritime region of Peru, the soil is generally arid. Borax, copper, and other minerals are worked.

A'res, the Greek god of war, or more particularly of its horror and tumult, was the son of Zeus and Hera, and one of the favourites of Aphrodite. He is represented in Greek poetry as a most sanguinary divinity, delighting in war for its own sake, and in the destruction of men. Before him into battle goes his sister *Eris* ('Strife'); along with him are his sons and companions, *Deimos* ('Horror') and *Phobos* ('Fear'). He does not always adhere to the same side, like the great *Athena,* but inspires now the one, now the other. Nor is he always victorious. Diomed, by the help of Athena, wounds him, and in his fall, says Homer, 'he roared like nine or ten thousand warriors together.' It is certain he was not originally a god of war, but it is disputed whether he was originally a storm-god, a god of the sky, sun, or light. Probably he was originally a chthonic deity, and as such brought pestilence and destruction. The worship of Ares was imported from Thrace. There Ares was believed to have his chief home. He had, however, temples or shrines at Athens, Sparta, Olympia, and other places. On statues and reliefs he is represented as young and of great muscular power, either naked or clothed with the chlamys. The Romans identified their national war-god Mars with the Greek Ares. See MARS.

Aretæus, a Greek physician of Cappadocia, who flourished about 100 A.D. He is considered to rank next to Hippocrates in the skill with which he treated diseases; was eclectic in his method; and in the diagnosis of disease is superior to most of the ancient physicians. The first four books of his great work, preserved nearly complete, treat of the causes and symptoms of diseases; the other four, of the cure of the same. There are editions by Wigan (1823) and Adams (Greek and English, 1856), and a translation by Reynolds (1837).

Arethu'sa. See ALPHEUS.

Aretin'ian Syllables are the syllables *ut, re, mi, fa, sol, la,* used by Guido of Arezzo for the names of the notes in his musical scale. See GUIDO, SOLFEGGIO.

Areti'no, PIETRO, an Italian poet of the 16th century, was the natural son of a nobleman named Luigi Bacci, and was born at Arezzo, in Tuscany, in 1492. Banished from his native town, he went to Perugia, where he wrought as a bookbinder, and afterwards wandered through Italy in the service of

various noblemen. At Rome, he distinguished himself by his wit, impudence, and talents, and secured even the papal patronage, which, however, he subsequently lost by writing his sixteen shameless *Sonetti Lussuriosi*. He now went to the Medicean court, where John de' Medici grew fond of him, and even procured him an opportunity of ingratiating himself with Francis I. at Milan in 1524. A few years later, he settled at Venice, where he also acquired powerful friends. The Bishop of Vicenza not only soothed the irritation of the pope against Aretino, but also recommended him to the Emperor Charles V. The latter, as well as his chivalrous rival, Francis, and other great persons, pensioned the fortunate wit, besides enriching him with splendid presents. It is said that while laughing heartily at a droll adventure of one of his sisters, he fell from a stool, and was killed on the spot (1557). His poetical works include five witty comedies and a tragedy of some merit. His satire procured for him the name of 'the Scourge of Princes;' but it seems clear that he was equally well fitted to be their sycophant. Although the very impersonation of licentiousness, he had nevertheless the impudence to publish some books of a devotional kind, with the view of obtaining the favour of the pope. Aretino's letters, and those written to him by various eminent men, contain much interesting information regarding his life and times. Nothing in the history of Italian literature is more extraordinary than that this coarse, dissolute, and comparatively ignorant man should have been praised, courted, and almost worshipped as he was. See the Lives of him by Chasles (Par. 1873), Sinigaglia (Naples, 1882), Bertani (1902), and Edward Hutton (1922).

Arezzo (anc. *Arretium*), the chief city of an Italian province, is situated in a fertile valley near the confluence of the Chiana with the Arno, 38 miles ESE. of Florence. Arezzo was one of the twelve cities of the ancient Etruscans, and was famous for its pottery. It was devastated by Sulla during the Social war; was sacked by the Goths; and during the contest of the Guelphs and Ghibellines, fought stoutly for the latter, but ultimately became subject to Florence. The Piazza Grande, built by Vasari, is remarkable; the church Santa Maria della Pieve is founded on the site of a heathen temple. The Gothic cathedral (begun 1277) has a splendid high altar in marble by Giovanni Pisano; and the several churches contain fine specimens of the Tuscan school of painting. The city produces silk, and manufactures cloth, combs, and pottery; and it has a museum, library, and academy of sciences. Perhaps no city of its size has produced a greater number of celebrated men, among whom may be mentioned Petrarch; the poet Aretino; Spinello Aretino; Leonardo Bruni; Guido of Arezzo (probably); Cesalpino, the botanist; Pope Julius III.; and Vasari. Pop. (1901) 44,350; (1921) 51,862.

Ar'gala. See ADJUTANT.

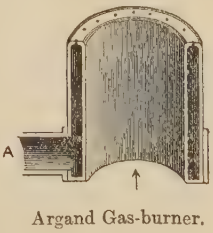
Argali (*Ovis argali;* also *Ovis ammon*), the great wild sheep of Siberia and Central Asia. It is found from Kamchatka to the Himalaya Mountains, where, however, it is only seen in the more elevated regions. 'We came suddenly,' says Dr Hooker in his *Himalayan Journal*, 'upon a flock of gigantic wild sheep, feeding on scanty tufts of dried sedge and grass; there were twenty-five of these enormous animals, of whose dimensions the term sheep gives no idea; they are very long-legged, stand as high as a calf, and have immense horns, so large that the fox is said to take up his abode in their hollows when detached and bleaching on the barren mountains of Tibet.' The horns of the male, which he uses for fighting, are nearly 4 feet long, and 14 inches in circumference at the base, where they are triangular. The general colour is dark gray, paler beneath, with a whitish disk around the tail. The wool is concealed by hair. The tail is a mere stump, an inch or so long. They are very keen-sighted, quick of hearing, and

Argali Sheep.

with a delicate sense of smell; they keep persistently to one place, and are little disturbed by the natives. They have great powers of leaping, even from heights of 20 or 30 feet. A similar but smaller form is also found on the Himalaya Mountains. The White-breasted Argali (*Ovis poli*) is another closely allied form inhabiting Northern Tibet. The Rocky Mountain sheep, or Big-horn (*Ovis montana*), which is sometimes called the American Argali, has very similar characters. See SHEEP; and for details as to Argali, Prjevalsky's *Mongolia* (1876).

Argan (*Argania Sideroxylon*), a low spiny evergreen tree of the Sapotaceæ, a native of Southern Morocco, bearing an ovate drupe about the size of a plum, dotted with white, and with white milky juice. The Moors extract an oil from the fruit, which they use with their food.

Argand, AIMÉ, physician and chemist, was born at Geneva in 1755. He was the inventor of the well-known *Argand lamp*. In the ordinary oil-lamp, combustion was not complete. Argand's improvement was that he made the wick in the form of a ring. The flame thus became a hollow cylinder with a current of air ascending through the inside, so that the burning surface was doubled. It would appear, however, that the lamp did not satisfy the expectations of Argand, till his younger brother accidentally discovered the effect of a glass cylinder, as a chimney over the flame, by which the flame was steadied, a draught created, and the greatest possible amount of light yielded. Argand was soon involved in a dispute with Langé as to the originality of his invention, but ultimately they shared the honour. The same principle is employed in the Argand gas-burner. Gas is admitted by means of a side tube (A in the fig.) into the space between two concentric cylinders. Argand, who lived for a time in England, died in 1803.



Argand Gas-burner.

Argania. See ARGAN.

Argaon, a village in the Akola district of Berar,

India, near which, in 1803, Wellesley defeated the Mahrattas (see WELLINGTON).

Argelander, FRIEDRICH WILHELM AUGUST (1799–1875), born at Memel. As chief of the observatory of Åbo, in Finland, he commenced observations, continued at Helsingfors, where he published a catalogue of 560 stars having 'proper motions.' A professor at Bonn, he published his *Uranometria Nova* (1837) and an *Atlas of the Northern Heavens* (1863). He studied the changes of light in variable stars, and proved a progressive motion of the solar system in space.

Argensola, LUPERCIO and BARTOLOMEO DE, the 'Spanish Horaces,' born in 1564 and 1565, were in succession historiographers of Aragon. The elder brother died in 1613, the younger in 1631.

Argentan, a Norman town in Orne, 42 miles SSE. of Caen, with a pop. of 7000.

Argentina, or the ARGENTINE REPUBLIC, is the second in size and by far the most prosperous of the republics of South America. The form of government is federal, the republic consisting of 14 provinces, 10 territories, and 1 federal district. It is bounded on the N. by Bolivia; on the E. by Paraguay, southern Brazil, Uruguay, and the Atlantic Ocean; on the S. by the Antarctic Ocean; and on the W. by Chile (with the Cordillera de los Andes as frontier). Of the island of Tierra del Fuego, the eastern portion belongs to Argentina; Chile owns both shores of Magellan Strait. The national capital, the city of Buenos Aires (q.v.), is a federal district (72 square miles). The provinces are: Buenos Aires (117,777 sq. m.), Santa Fé (50,713), Entre Ríos (29,241), Corrientes (33,535), La Rioja (37,839), Catamarca (36,800), San Juan (37,865), Mendoza (56,502), Córdoba (66,912), San Luis (29,035), Santiago del Estero (55,385), Tucumán (10,422), Salta (48,302), Jujuy (14,802). The territories are: Misiones (11,511), Formosa (41,402), Chaco (52,741), Pampa (56,320), Río Negro (79,805), Neuquén (40,530), Chubut (93,427), Santa Cruz (109,142), Tierra del Fuego (8299), Los Andes (34,740). The total area exceeds 1,153,000 sq. m. The *population* of the Argentine Republic in 1869 was 1,830,214; in 1895 it was 3,954,911; at the census of 1914 it was 7,885,237, and now it is some 10,000,000. This includes 30,000 pure Indians.

The country has, in the past, been largely peopled by immigrants from Europe; in the early years of this century the Italian immigrants formed about 50 per cent. and the Spanish 30 per cent. of the total. Now the Spanish immigration exceeds the Italian. The Spanish are the most welcome of all the foreign settlers, for they are sturdy peasants, valuable for the development of the country. Many come to reap the harvest and return with their savings. Of late years the average immigration has been about 170,000, and the emigration some 60,000. The following are the chief towns: Buenos Aires, 2,310,441; Rosario, 265,000; Córdoba, 156,000; La Plata, 151,000; Tucumán, 91,000; Santa Fé, 59,000; Mendoza, 58,000.

Physical Features.—The country may be divided into four regions: firstly, Patagonia, which stretches from the Río Colorado to Cape Horn; secondly, the Andine region, which runs from the southern frontier of Bolivia right along the Chilean border; thirdly, the Gran Chaco, which embraces the whole of the north of Argentina except the Andine strip; fourthly, the Pampa, which comprises the central and best-known region. The section between the Uruguay and the Paraná (Entre Ríos, Corrientes, Misiones) forms 'Mesopotamia.' Patagonia has been called the Great Shingle Desert. In the Andine region the towering Cordillera attains its chief heights. In the province of Mendoza are to be found Aconcagua (23,392 feet), Tupungato, and several other peaks of some 20,000 feet. Owing to want of moisture the mountains are bare and the scenery is less imposing than in other parts of South America. Among offshoots of the Andes are the sierras of Humahuaca (Jujuy), Aconquija (Tucumán and Catamarca), and Famatina (La Rioja). The Gran Chaco is a rough denomination for the subtropical north, where rice and the sugar-cane are cultivated; but its development has hardly been begun, and a large part is covered with dense forests, ranged by savage Indians. Córdoba has mountain-ranges in the north and west. The real Argentina is the Pampa, the middle tract, consisting of grassy plains and rich corn-lands, and including very little waste land, for the vast plain is broken only by two small mountain-ranges, the Tandil and the Ventana. Geologically it once formed part of the great Pampean Sea, and now consists of the Pampean mud, which contains an extraordinary number of mammalian remains. The northern portion contains many *salinas* (salt lakes and deserts). The Pampa region now has practically all the political and industrial significance which belongs to Argentina; the other parts possess natural wealth, and may have a great future, but as yet they are only the raw material of a state. The climate of Argentina varies greatly, as is natural in a country extending over 2300 miles north and south (from 22° to 55° 30′ S.). The seasons are the reverse of those in Europe. The north is hot, while in the south and on the Andes the cold is severe. In Buenos Aires is found a characteristic climate of mild winters and moderately hot summers, and this extends over the whole province of that name, and also over Santa Fé, San Luis, Mendoza, parts of Córdoba, and parts of one or two adjacent provinces. The climate of Buenos Aires (city and province) is fresher than that of the other provinces. Its worst feature is the north wind, which is considered extremely unhealthy; while the *pamperos*—the strong winds from the south-west—blow with terrific force, and cause great variation in temperature. The rainfall of Buenos Aires (city) averages nearly 34 inches. San Juan has about 4, Mendoza 6, Tucumán 39, Corrientes 59, Ushuaia (Fuego) 120 inches per annum. The littoral districts have most rain, the Andine regions very little. The coast is low and sandy to the north; higher, with frequent cliffs and bluffs, to the south. Argentina is on the whole well watered. The chief rivers (valuable for irrigation or navigation purposes) are the Paraná and Uruguay, entering the river Plate (see LA PLATA); the Colorado, Negro, Chubut, Deseado, Santa Cruz, and Gallegos, in the south. The largest lakes are Mar Chiquita (a salt lake in Córdoba), Nahuel Huapi (Río Negro), Buenos Aires, San Martín, Viedma, and Argentino (Santa Cruz).

The flora of Argentina varies according to the physical divisions of the country. The Pampas are covered with hard or soft grass—*pasto duro* or *pasto blando*. In that part the vegetation shows almost complete uniformity; W. H. Hudson remarked that the Pampas are the poorest in floral species of any fertile district in the world. It is in the Gran Chaco that the most variety is to be found, where the wax palm (*Copernicia cerifera*) is prevalent. A predominant tree is the *algarroba*, a kind of Prosopis, and the *quebracho*, *urunday* (*Astronium fraxinifolium*), and *lapacho* (*Tecoma curialis*), yield valuable timber. Scrub prevails in a great part of Patagonia. Among native animals of the plains are the wild llama (see HUANACO), the fox, skunk, and various species of deer and ant-eaters. In the Chaco the fauna exhibits greatest variety. Here is to be found, though rarely, the jaguar, most ferocious of South American beasts, and very destructive both to men and cattle. The puma also takes its toll from domestic animals, but is said to be harmless to man. The tapir is not savage. Snakes are fairly common, but few are dangerous. In the

great rivers the alligator is common, and the fish are good and plentiful. Insects abound.

Products.—As an exporter of grain and meat, and agricultural and pastoral products generally, the republic is celebrated all over the world. By 1895 only 12,230,000 acres had been brought under cultivation. By 1920—thanks to railways, foreign capital, immigration, and other stimuli—the total had risen to 62,500,000, and the productive land awaiting development was estimated at four or five times that figure. Drought is being encountered by irrigation works, but no effective means has yet been found of ridding the land of the locusts which swarm in myriads from the hot northern deserts, devouring all vegetation.

The most important, though not the oldest, industry is wheat-growing. The wheat area sprang from 271,000 acres in 1874 to 1,717,000 in 1884, and in the next thirty years the area multiplied tenfold. The acreage is now 19,000,000. It is said that 70,000,000 or 80,000,000 acres could at once be brought under the plough for wheat were the labouring hands available. The chief wheat areas are Buenos Aires, Santa Fé, Córdoba, and Pampa. Early in the century maize made enormous progress, and in 1912 the area sown was 9,500,000 acres and the production 7,500,000 tons. This immense volume of production has somewhat slackened, but Argentina remains the chief maize-exporting country of the world. In the grain countries and also in Entre Ríos flax is grown extensively. Oats are a considerable crop. The value of alfalfa (lucern) to the stock-raiser and as an article of export is much appreciated; it yields several crops per annum, and in addition fertilises the soil. Sugar has been cultivated for 200 years at Tucumán. The Argentine government has set itself to secure this industry from all foreign competition and, by a system of rigorous protection, has succeeded perfectly. Tucumán and one or two other districts now supply the home demand, and sugar imports are almost non-existent. The wine industry is centred in Mendoza and San Juan. The red and white clarets of Mendoza are of high quality. Minor products are *yerba mate*, or Paraguay tea (in Corrientes and Misiones), tobacco, rice, and rubber. In the forests of Santiago del Estero and the northern sub-tropical region quebracho is the chief wood worked. Timber is capable of great development.

For stock-raising Argentina has always been renowned since the Spaniards introduced sheep and cattle at the beginning of the 16th century. In 1920 a stock census was taken. There were 45,303,419 sheep, 27,392,126 cattle, 9,366,455 horses, 4,670,130 goats, 3,227,346 pigs, and 600,000 mules.

The cattle industry has made enormous strides of late years. In quite modern times animals were killed for their hides and the carcasses left to rot on the ground; but now the export of beef is on a large scale, and the prosperity of the industry is due to the far-sighted enterprise of the *estancieros* (owners of ranches), who sedulously import the best blood stock. Enormous exports, heavy home consumption, excessive slaughter of cows, droughts, disease, and the encroachments of agriculture on pasture-lands in Buenos Aires and other cereal regions have prevented the herds from increasing since 1908. Sheep-farming, after a period of retrogression—the number of sheep was reckoned at 100,000,000 in 1895—is now again going ahead, thanks to the opening up of Patagonia, where very large flocks of sheep are now pastured. The export of various pastoral products has long been upon an enormous scale. Besides chilled beef and frozen lamb, great quantities of ox-hides, sheep-skins, tallow and grease, preserved and salted beef and tongues, extracts of meat, bones, and kindred products figure on the list of exports. The Bovril and Lemco Companies, as well as the other progressive *estancieros*, have notably improved the breed of cattle by importing Durhams, Herefords, and Aberdeen-Angus, and other valuable strains, in supplying which Great Britain has a virtual monopoly. The same applies to the breed of horses, which have reached a high standard by the importation of British stallions—racing, hackney, and draught.

Mining is inconsiderable. Gold is worked to some extent in La Rioja, and the Famatina mines have been fairly productive. Silver and copper and coal are mined in the Andine districts. In Comodoro Rivadavia (Patagonia) and other districts of the south there are petroleum borings, yielding 3½ million barrels annually. The oil industry is mainly in the hands of the government. The manufactures of Argentina, though fostered by vigorous protection, are not as yet very considerable. In the manufacture of boots a high standard of excellence has been reached. The foreign trade of the republic has long been advancing. Britain sends to Argentina cotton and woollen goods, iron, steel, machinery, railway material, coal, and sacking. In 1927 the imports of Argentina were valued at £169,962,300, the exports at £200,035,500. In that year Argentina sent to Great Britain exports to the value of £76,584,488. The imports from Great Britain were valued at £26,998,373.

Nothing has contributed to the prosperity of Argentina more than its splendid railway system. There are nearly 22,000 miles of railway in operation, which have been mostly built by British capital. There are four great broad-gauge companies, all British owned and managed. They are:

The Buenos Aires Great Southern, which principally serves the important Province of Buenos Aires and extends south far beyond Bahía Blanca. Its mileage is larger than that of any other line in the republic. *The Buenos Aires and Pacific*, which was the first railway in South America which succeeded in linking the Atlantic and Pacific Oceans, for since 1910 trains have been running between Buenos Aires and Valparaíso. In 1926, however, that feat was repeated, for a railway in Bolivia was completed from Tupiza to Atocha, and thus it is possible to journey by rail from Buenos Aires to Antofagasta. *The Buenos Aires Western*, the oldest line in Argentina, dating from 1857. It runs from Buenos Aires to Mercedes and then branches into four trunk lines, all running in a westerly direction. *The Central Argentine*, which connects the capital with Rosario and the important towns in the north. Besides these four great systems there are many other lines, large and small, employing a variety of gauges.

There are over 25,000 miles of telegraph lines. There is communication with Asunción (Paraguay) both by rail and steamer.

Government.—The Argentine constitution, based on that of the United States, is federal in type. The executive power is vested in the president, who is elected for six years and assisted by eight secretaries of state. The National Congress exercises legislative functions, and consists of a Senate with 30 members and a House of Deputies with 158. Justice is administered by Federal and Provincial Courts. Argentina has been honourably distinguished from most Latin-American republics by its almost complete immunity from civil wars and revolutions. Roman Catholicism is the religion of the people, but there is no state religion, and all creeds are tolerated. There are several Jewish colonies.

All males born in Argentina are liable to military service from the age of twenty to forty-five. The peace strength of the army is about 25,000; there is a national reserve of 300,000. The navy consists of two Dreadnoughts, four armoured cruisers, and a number of smaller vessels, and the crews number over 11,000. The naval port is Puerto Belgrano, near Bahía Blanca.

In 1925 the revenue was $588,641,067, and the expenditure $588,641,067. The total public debt was estimated at $2,843,018,000. The gold dollar is worth about 4s.; the paper peso, which is employed in the above figures, is worth slightly over 1s. 9d. Primary education is secular, free, and compulsory. Secondary education is controlled by the Federal government. There are national universities at Córdoba (founded 1613), Buenos Aires (1821), La Plata (1905), Tucumán (1912), Rosario (1920). There are also two provincial universities, one at Santa Fé and the university of Cuyo for the provinces of Mendoza, San Juan, and San Luis.

Argentina is distinguished above all South American countries by the excellence of its newspapers, of which *La Nación* and *La Prensa* are the chief. In literature it takes a high place. In Spanish days there was little literary activity except in the church. Dean Funes (*d.* 1829), a pupil of the Jesuits before their expulsion, wrote a valuable history of the Plate district. Early in the 19th century there was an outburst of patriotic poetry due to the revolution, and among its writers Juan Cruz Varela (1794–1839) was the most meritorious. Later in the century resistance to the tyranny of Rosas inspired the young men of letters, notably Esteban Echeverría (1805–1851) and José Mármol (1818–1881), poet and novelist, who was perhaps the greatest Argentine author. His novel *Amalia* is a masterpiece. J. M. Gutiérrez (1809–1878) was a busy poet and man of letters. The statesman and general Bartolomé Mitre (1821–1906) distinguished himself as a historian. The modern school of Argentine poetry is prolific and influential. At least one great novel has been produced in recent years, *La Gloria de Don Ramiro*, by Enrique Larreta. Among other recent writers may be mentioned Martín García Merou, Ernesto Quesada, and E. García Velloso, all accomplished critics. Perhaps the publicists have in recent years brought

most distinction to the intellectual life of the republic. Carlos Calvo (1824–1893) was an eminent writer on International Law, and L. M. Drago has made history by his exposition of the Drago Doctrine (see VENEZUELA). The future of Argentine literature is full of promise.

History.—Very little is known of Argentina before the advent of the Spaniards. The hardiest natives were the Araucanians, a branch of the Ando-Peruvian race. The Pampean race belongs to a lower grade, and includes the Patagonians and Puelches of the south, and many northern tribes such as the Charruas. The distinct Brasilio-Guaranians include the rude tribes who were civilised by the Jesuits. All were in a very low state of civilisation. The search for a westward sea-route to the Moluccas led to the discovery of the Argentine and of the Magellan Strait (1520). In 1516 the Spaniard Juan Diaz de Solis sailed up the river Plate, but was slain by the savages as soon as he landed; and an expedition of Cabot some ten years later made no serious attempt at a settlement. In 1535 Pedro de Mendoza arrived with a large force and founded the city of Buenos Aires. Incredible difficulties were encountered both from scarcity of food and the hostility of the Indians, and the city was twice abandoned. But the Spaniards were more successful at Asunción, now the capital of Paraguay, and in 1573 the brave Juan de Garay, advancing southward from that city, founded Santa Fé, and in 1580 was strong enough to refound Buenos Aires, which soon became a flourishing place. The Spanish system of colonial government was neither energetic nor efficient, but English and North American writers have exaggerated its defects. The cruelties of the settlers were tempered by Jesuits (till their expulsion, 1767) and crown officials, and the easy-going paternal rule of the Spanish king was not unsuited to the indolent yet adventurous Indo-Spanish race which sprang up on the banks of the river Plate. In 1620, on the advice of Hernanderias de Saavedra, the enlightened governor of La Plata (a captaincy-general including modern Paraguay and Uruguay), Buenos Aires, with territory forming the nucleus of modern Argentina, was made into a separate province under a governor. The 17th century was largely occupied with Indian wars, the first three-quarters of the 18th with struggles against the English, who assailed the Spanish monopoly, and with aggressions from the Portuguese in Brazil. In 1776 Buenos Aires became capital of the new viceroyalty of La Plata, embracing Argentina, Bolivia, Paraguay, and Uruguay, and was at last entitled to trade direct with Spain, instead of only *viâ* Lima, in the viceroyalty of Peru, as in the past. The colonists now became aware of the weakness of Spain, and, led by Liniers, learned their own strength in frustrating the British attack in 1806 under Beresford and that under Whitelocke in 1808. Whitelocke had a large army and fleet, but owing to incapacity lost a large part of his force in an attempt upon Buenos Aires, and, to recover his prisoners, agreed to evacuate the whole of the Plate district. He was cashiered for his misconduct, and the success of the colonists in routing this formidable force encouraged them to revolt against Spain. As Spain was distracted by the Napoleonic war, the colonists founded a local provisional government in 1810. A sanguinary war for independence ensued, in which Generals Belgrano, San Martín, and Alvear, and Almirante Brown, especially distinguished themselves. In 1823 Britain recognised the United Provinces of Río de la Plata. Rivadavia, who was president in 1825, ruled like a statesman, but was driven out in 1827 by the factions which were long the curse of the new republic. There was a period of confusion, and in 1829 Rosas was elected captain-general; he ruled with a strong hand, and at first his dictatorship seemed likely to be beneficial. But, as Darwin noted, he bitterly disappointed expectations, and became a cruel tyrant, suppressing all his opponents by violence and executions. This era has left its mark on the literature of the republic, for all the young Liberal poets and patriots engaged in continuous plots against his rule. But it was not till 1852 that the faction hostile to Rosas, with the help of Uruguay and Brazil, defeated him at the battle of Caseros, and the tyrant fled to Europe. In 1853 the Federal Constitution was drawn up, which remains substantially in force. Struggles between the Porteños (of Buenos Aires) and the Provincials, between Unionists and Federalists, continued to hamper progress; but the Brazilian-Argentine war against Paraguay (1865–70) was a still more serious obstacle. In the 'seventies material prosperity began to revive, and in 1878 General Roca greatly enlarged the boundaries of the republic by reducing Patagonia. In 1880 Roca proclaimed Buenos Aires federal capital and established a strong central government, while retaining the federal constitution. During the 'eighties trade increased by leaps and bounds, and capital poured into the country; but overestimation of its resources led to frantic speculation, and government, provinces, municipalities, and individuals indulged in wasteful expenditure. A revolution broke out in 1890, and though a serious attempt was made to reform abuses, the inevitable financial crash came in 1891, and a period of depression ensued. Recovery was promoted by the wise measures of General Roca, during whose presidentship (1898–1904) a dangerous boundary dispute with Chile was settled (1902) by the arbitration of King Edward VII. The centenary of the independence of Argentina was celebrated in 1910, but the festivities were somewhat marred by disturbances created by anarchists and socialists. About this time both Argentina and Brazil made considerable increases to their navies, but both republics disclaimed any warlike intentions, and no untoward results have followed. Argentina suffered considerably by disturbance of trade in the Great War. The republic figured in a notorious incident. Count Luxburg, the German chargé d'affaires at Buenos Aires, sent telegrams advising his government either not to sink Argentine vessels at all or to sink them without leaving any trace (*spurlos versenkt*). This affair caused great indignation in Argentina, and the German government apologised, declaring its disapproval of the advice of Count Luxburg. However, the republic avoided breaking with Germany, and maintained a strict neutrality. As was the case with most countries, Argentina experienced considerable trouble after the conclusion of the Great War. There were serious risings inspired by Bolshevist principles, and in January 1919 a general strike was proclaimed. President Irigoyen took vigorous measures against the insurgents, who had schemed to seize control of the capital, and the outbreak was effectively suppressed, after severe fighting. In a conflict outside the general post office of Buenos Aires nearly 1000 casualties occurred. The recent history of Argentina has been uneventful, and the country has regained its normal prosperity. In 1922 Dr Marcelo Alvear was raised to the presidency. In 1925 the visit of the Prince of Wales to Argentina gave rise to great enthusiasm, as might have been expected from the hundred-year-old friendship between the two countries. Much social legislation has been passed of late years, some of which has proved most unpopular both with employers and employed. The Pension Act had to be sus-

pended altogether as unworkable. Argentina has long showed her political stability, and is continuing in the course of peaceful progress which she has long pursued.

See ANDES, BUENOS AIRES, LA PLATA, PATAGONIA; and South America under AMERICA; W. H. Hudson, *A Naturalist in La Plata* (1903); W. A. Hirst, *Argentina* (1910); A. B. Martinez and M. Lewandowski, *The Argentine in the Twentieth Century* (tr. 1911); A. B. Martinez, *Baedeker of the Argentine Republic* (4th ed. 1916); W. H. Koebel, *The New Argentine* (1923); Sir S. H. M. Killik, *Manual of Argentine Railways* (published annually); J. A. Hunter, *The South American Handbook* (published annually); also *The Statesman's Year-book*, which gives useful information and a valuable bibliography. For history see G. Funes, *Ensayo de la Historia del Paraguay, Buenos Aires y Tucumán* (Buenos Aires, ed. of 1910); C. E. Akers, *History of South America* (1912); E. García Velloso, *Historia de la Literatura Argentina* (Buenos Aires, 1914).

Ar'gentine (*Argentina*), a small smelt with silvery scales, abundant in the Mediterranean.

Arges, a genus of small bony fishes belonging to the family Loricariidæ, allied to the Silurids. They are found at great altitudes (up to 10,000 feet) in the volcanic regions of the Andes, and according to Humboldt's account (1805) they are ejected along with torrents of hot muddy water from the craters and sides of the volcanoes. In reality they are carried down during volcanic disturbances, not from the volcanoes, but from the mountain torrents, and huge numbers may be spread out on the flooded ground far below.

Argol is a crude variety of cream of tartar which forms a crust in the interior of wine-vats and wine-bottles, and is used for the preparation of Cream of Tartar (q.v.) and Tartaric Acid (q.v.).

Ar'golis. See ARGOS.

Argon. The discovery of a new gaseous constituent of the atmosphere, to which the name argon was afterwards given, was first announced at the British Association at Oxford in 1894 by Lord Rayleigh and Ramsay. This gas, which forms rather less than 1 per cent. by volume of the atmosphere, appears to have been in the hands of Cavendish in 1785, but it was not recognised by him as a separate substance. In making a series of careful determinations of the density of nitrogen, Lord Rayleigh found in the course of experiments, extending over several years, that the density of nitrogen obtained from the atmosphere was uniformly greater than that of nitrogen prepared from nitrogen compounds. Hence he was led to examine atmospheric nitrogen for the presence in it of traces of a denser gas. For this purpose he employed the method of Cavendish—i.e. passing electric sparks through a mixture of air and a sufficiency of oxygen, absorbing the gases so formed by means of alkaline solutions, and then, when no further diminution of volume could be produced, removing the excess of oxygen. A small residue of argon was always obtained. Ramsay prepared argon from the air by first separating the oxygen and then removing the residual nitrogen by means of red-hot magnesium. Argon is a colourless gas which can be liquefied on being subjected to a very low temperature. It has also been solidified. It is now classed as an element, with atomic weight 39·88. It does not combine with any other element.

Intimately connected with the discovery of argon is the discovery of helium. Lockyer and Frankland gave the name helium to a supposed element detected spectroscopically in the sun's chromosphere during the eclipse of 1868 (see SUN). In March 1895 Ramsay announced the discovery by means of the spectroscope of a new gas identical with helium in the mixture of gases obtained by boiling the mineral clèveite with dilute sulphuric acid—a mixture also obtained by heating clèveite or bröggerite in an exhausted tube. At a later date Ramsay, along with Collie and Travers, found helium to be much less dense than any known gas except hydrogen. Its relative density is 2, and it also is an elementary gas, closely allied chemically to argon. The spectrum of helium is characterised by five very brilliant lines—in red, yellow, blue-green, blue, and violet. For the production of helium from radium emanation, see RADIUM.

In 1898 Ramsay and Travers discovered three more elementary gases belonging to the same family as argon and helium, and they named them neon, krypton, and xenon. All occur in minute proportions in the atmosphere, and can be obtained, by fractional separation, from crude argon.

The discovery of the helium, argon, &c. group of elementary gases necessitated some modification of the periodic classification of the elements (see ATOMIC THEORY), since they did not fill any foreseen blanks in the Periodic System. They are now placed by themselves in a new group, possessing valency = 0, and when so placed they fit into the general system in a sufficiently satisfactory manner.

Argonaut. See NAUTILUS.

Ar'gonauts, heroes of Greek Mythology who, in their ship *Argo*, undertook a long voyage into unknown seas, under the command of Jason. Pelias, usurping king of Iolcus in Thessaly, to get rid of his nephew Jason, sent him to fetch the Golden Fleece from Colchis—the fleece of a sacred ram which Æetes had hung up on an oak in the grove of Ares, where it was guarded day and night by a sleepless dragon. Jason caused Argus to build a ship of fifty oars; and for this adventure gathered together the bravest heroes from all parts of Greece, fifty in number (including Hercules, Castor and Pollux, Theseus, &c.). By Lemnos, along the coast of Thrace, up the Hellespont, and over the Black Sea they sailed, with many adventures, such as passing safely between the Symplegades, two rocks near the entrance of the Black Sea that were wont to close in on and crush all ships trying to pass through. At length they arrived at the mouth of the river Phasis, in Colchis. Here King Æetes promised to give up the golden fleece to Jason, on condition that the latter should yoke to a plough two fire-breathing bulls with brazen hoofs, and should sow the dragon's teeth not already sown by Cadmus in Thebes. Jason, by the help of the famous sorceress Medea, daughter of Æetes, who had fallen passionately in love with the bold navigator, fulfilled these conditions; and was also assisted by Medea (q.v.) in still more wonderful exploits. He obtained from her, under promise of marriage, a charm against fire and steel, and was enabled to destroy all the warriors who sprang up from the land sown with the dragon's teeth. While Jason was engaged in this task, Æetes formed a plan to burn the ship *Argo* and put the crew to death. By her help he stupefied the dragon-sentinel by an opiate-charm prepared by Medea, seized the golden fleece, and, embarking in the *Argo* with his mistress, sailed away from Colchis by night. In spite of the pursuit of Æetes and of the charms of the Sirens, and of storms that drove them to Crete, Corcyra, and elsewhere, they arrived safe at Iolcus; and Jason dedicated the good ship *Argo* to Poseidon at Corinth. The story is referred to in the *Odyssey*, is related by Hesiod, and told with great fullness by Apollonius Rhodius, but the discrepancies are great. And the Greek epic is but one form of a widely diffused folk-tale, of which Lang collected variants from Samoyed, Epirot, Kaffir, Malagasy, Algonquin, Gaelic, Norse, Russian, Italian, Japanese, and Samoan sources.

See Grote's *Greece;* Lang's *Custom and Myth;* Roscher's *Lexikon der Mythologie;* Friedländer in *Rhein. Museum* (1914).

Argos, reputed the oldest city in Greece, stood 3 miles from the sea in the north-east peninsula of the Peloponnesus, figures largely in the mythical ages, and was the nucleus of a kingdom of which in Homer's time Mycenæ (q.v.) was the capital. From it all the Greeks were known as Argives. After the Dorian invasion (see GREECE) Argos still remained, under the Dorians, the chief state in the Peloponnesus, but decayed from the 7th century B.C., till about 495 Sparta robbed it of supremacy and influence. It sided with Athens in the Peloponnesian war, joined the Achæan league in 243 B.C., and it and its territory, known as Argolis, became part of the Roman province of Achaia in 146. Argolis is still the name of the peninsula lying between the bays of Nauplia and Ægina. With Corinth, it forms one of the provinces of Greece, with an area of 1800 sq. m., and a pop. of 176,000. In the plain of Argos was the Lernean marsh, home of the Hydra slain by Herakles. It is surrounded by mountains (summits 6000 ft.), which also gird the coast. The modern and prosperous town of Argos is built on the site of the ancient city, 7 miles from Nauplia (q.v.), and has still remains of its cyclopean walls and its rock-hewn amphitheatre. Pop. 10,000.

Argos'toli, a seaport of the Ionian Islands, capital of Cephalonia, is the seat of a Greek bishop, and has a good harbour. The 'sea-mills of Argostoli' are two holes in the rocky coast into which the sea pours with a force sufficient to drive two mills, and disappears, to return, most likely, through brackish springs. Pop. 11,400.

Argot. See SLANG.

Arguelles, AUGUSTINO, born in Asturias in 1776, gained a high reputation for patriotism and eloquence in the cortes (1812–14). Arrested at the restoration, he suffered ten years' captivity till the revolution of 1820. He was made Minister of the Interior, but on the fall of the constitution (1823) he fled to England, where he remained till the amnesty of 1832. Afterwards he was vice-president and president of the Chamber of Deputies; and died March 23, 1844.

Argus, the son of Zeus and Niobe, third king of Argos, which took from him its name.—ARGUS, son of Agenor, or of Inachus, surnamed Panoptes ('all-seeing'), had one hundred eyes, some of which were always awake. Hence Hera appointed him to watch over the cow into which Io had been transformed. Hermes being commissioned by Zeus to carry off the cow, slew Argus by stoning him; or, as Ovid says, first charmed him to sleep by playing on the flute, and then cut off his head. Hera put his hundred eyes in the tail of the peacock, her favourite bird.—ARGUS, the builder of the ship *Argo* (see ARGONAUTS).

Ar'gus Pheasant, a genus (Argusianus) of gallinaceous birds, remarkable for magnificence of plumage. The best-known species, *Argusianus argus* of Malaya and Sumatra, is entitled to be regarded as the true Argus. The bill is nearly as long as the head; the sides of the head and of the neck are almost destitute of feathers; the tail consists of twelve feathers, of which the two middle ones in the male are very much elongated, and the secondary feathers of the wings are much longer than the primary. The name argus has allusion to the many beautiful eye-like markings which adorn the plumage of the male, and particularly the secondary wing-feathers. The primary feathers are also exquisitely marked. The ornaments are hidden except when the male shows himself off to his mate. 'He then erects his tail, and expands his wing-feathers into a great, almost upright circular fan or shield, which is carried in front of the body. The neck and head are held on one side,

Argus Pheasant (from Darwin).

so that they are concealed by the fan; but the bird, in order to see the female before whom he is displaying himself, sometimes pushes his head between two of the long wing-feathers, and then presents a grotesque appearance.' The marvellous decoration, according to Darwin, serves solely as a sexual charm, and the development of the ball-and-socket or eye-like markings, which he has shown to be connected by a perfect series of gradations with the simple spots, affords beautiful illustration of variation associated with *Sexual Selection* (q.v.). The decorative development seems really to have gone too far, for the size of the secondary wing-feathers is said almost to deprive the male bird of the power of flight. The female is of comparatively tame plumage, not only wanting the eye-like markings, but also the great length of the secondaries and of the middle tail-feathers. The size of the bird, when divested of its plumage, is not much greater than that of a common barn-door fowl; but the total length of the male, including tail-feathers, is over 5 feet, and the secondaries alone may be almost 3 feet long. Besides the true argus, there is another type, *Reinhardtius* (*Argus*) *ocellatus*, one of the rarest of game birds, obtained from the Tonkin highlands. The argus is impatient of confinement, and has very seldom been brought alive to Europe. See Darwin, *Descent of Man.*

Argyll. See ARGYLLSHIRE.

Argyll', ARCHIBALD CAMPBELL, MARQUIS OF, was the descendant of Sir Colin Campbell of Lochow or Loch Awe, who was knighted in 1286, and who through his prowess bequeathed to the chiefs of his line the Gaelic title of MacCailein Mor. Sir Duncan Campbell of Lochow was raised to the peerage as Lord Campbell in 1445; and Colin, his son, was created Earl of Argyll in 1457. The second earl fell at Flodden (1513); the fourth, who died in 1558, was the first of the Scottish nobility to embrace the Reformation principles; and the fifth (1530–73) figured prominently in Mary's reign, first as a Lord of the Congregation, and next as an adherent of the queen. ARCHIBALD was born in 1598, and in 1619, his father having turned Catholic and quitted Scotland, became the sole potentate of all the broad lands of his line.

He succeeded as eighth earl in 1638. Already he had given proofs of that strength of religious principle which marked his whole life, and of a perilous union of attachment to the king and of faith in the principles against which the king made war. In the General Assembly at Glasgow (1638), he openly took the side of the Covenanters, and next year he joined Leslie's encampment on Duns Law. In 1640 he marched with 4000 men through Badenoch, Athole, Mar, and Angus, enforcing subjection to the Scottish Parliament. Charles, on his visit to Scotland in 1641, found it expedient to show peculiar favour to Argyll, and raised him to the dignity of marquis. In 1644 he dispersed the royalist forces under Huntly; but he was less successful in withstanding the genius of Montrose, who in 1645 annihilated his army at Inverlochy. His estates had suffered so much from Montrose's ravages, that in 1647 £40,000 of the public money was voted for the support of himself and his clansmen. He was strongly opposed to the execution of the king; and in 1651 he crowned Charles II. at Scone, having previously made overtures to marry him to one of his own daughters. After the defeat of Worcester, he defended himself for nearly a twelvemonth, in his castle of Inveraray, against Cromwell's troops; but in 1652 he gave in his submission to the Protector. On the Restoration, he repaired to Whitehall, encouraged by a letter from his son; but he was at once arrested, and committed to the Tower. Thence taken by sea to Leith, he was brought before the Scottish Parliament on fourteen charges of compliance with the usurpation. He defended himself with spirit, but in vain; and on 27th May 1661 he was beheaded with the 'maiden' at the cross of Edinburgh—having displayed throughout his trial, and on the scaffold, the dignity of a true nobleman, and the meekness of a Christian. Hostile views have been taken of his character, not the most favourable being Scott's in the *Legend of Montrose;* and one point is certain—he was a coward in the field.—His son, ARCHIBALD, 9th Earl of Argyll, exhibited great bravery on the disastrous day of Dunbar, where he commanded a regiment on the royalist side. After Worcester, he continued, like his father, in arms, and made himself so obnoxious to Cromwell, that he was specially excepted from the act of grace in 1654. Acting under Charles's orders, he submitted next year to the Protectorate; but from 1657 to 1660 he was a prisoner. On the Restoration, he was received into high favour (as a balance to the execution of his father), and unfortunately for his own fame, participated in some of the iniquitous acts of the Scottish legislature. Thus, in 1681 he voted in council against Donald Cargill, and signed a letter upholding the divine right in its extremest form; yet, the same year, would only sign the new test with a reservation, which led to his trial for 'leasing-making,' and his condemnation to death. The devotion of his step-daughter enabled him to escape from Edinburgh Castle in the disguise of a page; and after remaining some time in concealment, he fled to Holland. Landing in Argyllshire, in May 1685, with an armed force, to co-operate in Monmouth's rebellion, he was, after a series of misfortunes, taken prisoner, and beheaded at Edinburgh, on his former sentence, 30th June 1685.—His son, ARCHIBALD, an active promoter of the Revolution, was created Duke of Argyll in 1701, two years before his death.—His son, JOHN, 2d Duke of Argyll, was born in 1678. Destined, says Pope, 'to shake alike the senate and the field,' he as royal commissioner in 1705 had a principal share in bringing about the Act of Union; whilst as a soldier, from 1694 he distinguished himself under Marlborough at Ramillies, Oudenarde, and Malplaquet. Previous to the change of ministry in 1710, Argyll had been a keen Whig. He now veered with the wind of the court, and became a declaimer against Marlborough. For reward he was appointed by the Tories generalissimo of the British army in Spain; but considering himself to have been unhandsomely treated by the ministry, he shortly after returned, and finding his influence greatly diminished, again turned Whig. His tortuous career up to the '15 seriously detracts from his meritorious services during that critical period, which in 1718 gained him the English title of Duke of Greenwich. His restless vanity and ambition, however, constantly prompted him to political intrigues. In 1721 he again played into the hands of the Tories, for the purpose of securing the entire patronage of Scotland. In 1737 he rose into immense popularity in his own country, by his spirited defence before parliament of the city of Edinburgh in regard to the Porteous mob. He died 3d September 1743. He was a man of lax principles and selfish character, but possessed of considerable shrewdness and talent, and noted for a kindliness and courtesy in private life, which procured him the title of 'the Good Duke of Argyll,' and which are commemorated in Scott's *Heart of Midlothian.*—GEORGE JOHN DOUGLAS CAMPBELL, 8th Duke of Argyll, was born in 1823, and succeeded his father in 1847. At the age of nineteen, he wrote *A Letter to the Peers from a Peer's Son,* on the struggle which ended in the disruption of the Scottish Church; and seven years later appeared his *Presbytery Examined.* He was Lord Privy Seal (1853–55; 1859–66) and Postmaster-general (1855–58) under Lord Palmerston. Under Mr Gladstone he was Secretary of State for India (1868–74), and Lord Privy Seal (1880–81), a post he resigned, disapproving of the Irish Land Bill. His works include, besides papers on geology, a book on Iona, and a volume of poems, *The Reign of Law* (1866); *Primeval Man* (1869); *The Unity of Nature* (1884); *Scotland as it Was and as it Is* (1887); *The Unseen Foundations of Society* (1893). He died in 1900; see his *Autobiography and Memoirs,* edited by his widow (1906).—His eldest son, JOHN DOUGLAS SUTHERLAND CAMPBELL, 9th Duke (1845–1914), in 1871 married the Princess Louise, in 1878–83 was Governor-general of Canada, and in 1895–1900 was M.P. for South Manchester. He was author of tales and poems, books on Canada and imperial federation, lives of Palmerston and Queen Victoria, &c. On the Marquess and the 9th earl there are books by Willcock (1902–8).

Argyllshire, or ARGYLESHIRE, a county in the west of Scotland, cut up into many peninsulas by sea-lochs, and including numerous islands. It is 115 miles long by 55 broad, and, owing to the numerous indenting sea-lochs, its coast-line extends to over 2200 miles. Next to Inverness, it is the largest county in Scotland, its area being 3110 sq. m., of which 623 belong to the islands. No part is more than 12 miles from the sea or from large inland lochs. The chief islands are Mull, Islay, Jura, Tiree, Coll, Lismore, and Colonsay, with Iona and Staffa. The general aspect of Argyllshire is wild and picturesque, the northern part being everywhere mountainous, and presenting some of the grandest scenery in Scotland, as Glencoe. The highest peaks are Bidean nam Bian (3766 feet), Ben Laoigh (on the Perthshire boundary, 3708), and Ben Cruachan (3689). The chief sea-lochs are Lochs Moidart, Sunart, Linnhe (branching off into Lochs Leven and Eil), Fyne, and Long. The streams are short and rapid, the principal being the Orchy, running through Glenorchy into Loch Awe, and the Awe connecting that lake with Loch Etive. The fresh-water lochs are Loch Awe and Loch

Lydoch, the latter on the Perthshire border. The rocks of Argyllshire are mica-slate, which predominates on the mainland; lavas in Mull and Lorn; quartz rock in Islay and Jura; granite around Lochs Fyne and Etive; patches of Jurassic and Cretaceous in many of the isles; and a little Old Red Sandstone west of Loch Fyne and in South Kintyre. Lead has been mined at Strontian (where the mineral Strontianite was discovered), at Tyndrum, and in Islay and Coll; copper in Islay and on Loch Fyne. The Easdale and Ballachulish quarries supply the best roofing-slates in Scotland. Coal occurs near Campbeltown; fine marble in Tiree, &c.; excellent granite near Inverary; and limestone in most parts of the county. The fertile parts of Argyllshire lie along the arms of the sea and the streams. The soil is mostly a light, sandy, and gravelly loam along the coast and the sides of rivers, and gravelly, with a till bottom, on the hillsides. Sheep and cattle-rearing is the chief occupation of the farmer. Argyllshire abounds in deer and game. Loch Fyne was famed for its herrings. Loch Awe abounds in salmon and trout. In many parts of Argyllshire the peasantry are still very poor, notwithstanding that steamers now connect every portion of the coast with Glasgow, and that a railway to Oban (now London Midland and Scottish) was opened in 1880. The West Highland Railway (1894; now London and North-eastern) from Glasgow to Fort William runs through parts of the east and north-east of the county. The kelp industry, introduced into Tiree in 1746, had become all but extinct in 1863. The manufactures are unimportant, the chief being whisky, in Campbeltown and Islay, and coarse woollens for home use. The principal towns and villages are Inveraray, Campbeltown, Oban, Dunoon, Lochgilphead, Tarbert, Kinlochleven, Tobermory. The county returns one member to parliament. Pop. (1831) 100,973; (1881) 76,440; (1911) 70,902; (1921) 76,856—one-half Gaelic-speaking. The decrease has been chiefly due to emigration. Among the antiquities of Argyllshire are the ecclesiastical ruins of Iona and Oronsay, and the castles of Dunstaffnage, Dunolly, and Kilchurn. Iona cathedral was that of the bishopric of the Isles; what little remains of that of Argyll forms part of Lismore parish church.—*Argyll* is a district of Argyllshire separated from Cowal by Loch Fyne, and from Lorn by Loch Awe. See Lord Archibald Campbell's *Records of Argyll* (Edin. 1886).

Argyrokastron (the Turkish *Ergeri*), a town of Albania, Turkish till the war of 1912–13, near the Dryno, an affluent of the Viosa. It contains the ruins of an imposing castellated fort. In 1814 the town was almost depopulated by the plague, and the population for half a century did not exceed 5000, but is now about 12,000.

Argyropu'los, (1) JOANNES, one of the earliest teachers of Greek learning in the West, born at Constantinople in 1416, settled finally in Italy after the fall of his native city in 1453. He taught first at Florence, and here among his pupils were the son and grandson of Cosmo de' Medici; but on the outbreak of the plague in 1471 he repaired to Rome, and there he died, probably in 1486. From his school came many learned men, among them Poliziano and Reuchlin.—(2) PERIKLES, a Greek publicist, born September 17, 1809, at Constantinople, became professor of Jurisprudence at Athens in 1837, and soon made himself more notable than popular with the court party as a promoter of constitutional state reform in Greece, especially through his journal *Anamorphosis*. Elected to the Chamber in 1843, he was foreign minister from May 1854 to September 1855, when he returned to his academic chair. He died December 22, 1860.

Aria (Ital. 'air'), in Music, a rhythmical melody, as distinct from recitative. The term was formerly applied to a measured lyrical piece either for one or several voices; but is now commonly applied to a song introduced in a cantata, oratorio, or opera, and intended for one voice supported by instruments. The 'aria grande' has taken many forms, mostly of two classes—the aria with 'da capo,' in which the first section is repeated *in extenso* after the second or intermediary one, and the aria without 'da capo,' a more varied and extended form, in which the first section may be several times repeated, and the last time generally more or less expanded into a coda. The great masters have raised it to almost symphonic importance—e.g. Beethoven's 'Ah perfido,' or Mendelssohn's 'Infelice.'—ARIETTA is a short melody.

Ariad'ne, daughter of Minos of Crete and Pasiphaë. She fell in love with Theseus when he came to Crete with the annual tribute of the Athenians for the Minotaur, and gave him a sword with which to slay the monster, and a clew by means of which to find his way out of the Labyrinth. For this service Theseus promised to marry her, and she escaped with him, but was slain by Artemis on the island of Naxos. Such is the account of Homer, but according to a more common tradition, she was deserted by Theseus at Naxos, where she was found by Dionysus returning from his triumph in India. The youthful god was captivated by her beauty, and married her. At her death he gave her a place among the gods, and hung her wedding-crown as a constellation in the sky. Ariadne, as left forsaken by Theseus and found by Dionysus, has been a favourite subject for works of art.

Aria'no, a city of South Italy, in a pass of the Apennines, 84 miles NE. of Naples; pop. 20,000.

Arians. See ARIUS.

Arias Montanus, BENEDICTUS (1527–98), Catholic divine and learned orientalist, born in Estremadura, studied at Seville and Alcala, and became a Benedictine. He was present at the Council of Trent; in 1568 was sent by Philip II. to Antwerp to superintend the publication of the Antwerp Polyglot Bible (8 vols. folio, 1569–72); and became librarian at the Escurial.

Ari'ca, a seaport of Tacna, the most southerly department of Peru (provisionally occupied by Chile). It is one of the chief outlets of the trade of Bolivia, and has been connected since 1854 by rail with Tacna, and since 1912 with La Paz. It exports copper, silver, sulphur, borate, soda, salt, chinchilla skins, alpaca, and vicuña wool. It was almost wholly destroyed by earthquake in 1832, but soon rebuilt. It suffered severely again in 1868, the earthquake being succeeded by fearful waves, one of them 40 feet high. In the time of the Spanish supremacy, Arica was a great commercial city with 30,000 inhabitants; its present pop. is about 9000. It was taken by the Chileans in 1880; and the department of Tacna with Arica was to be occupied by Chile until a plebiscite should decide the ultimate sovereignty. See PERU.

Arichat, a seaport on the south side of Isle Madame, in the province of Nova Scotia; pop. 800.

Aricia, an ancient city of Latium, at the foot of the Mons Albanus, 16 miles SE. of Rome, and famous for the temple of Diana near it, in a grove on the lake now called Lake of Nemi (q.v.). The high-priest was a runaway slave, and obtained the office by slaying his predecessor—the usage expounded and discussed in all its bearings by Sir J. G. Frazer in his *Golden Bough* (1890; 3d ed. 1911–14).

Ariège, a department in the south of France, lying along the northern slopes of the Pyrenees. It contains some of the highest mountain-summits in France, such as Montcalm, 10,513 feet, and Estats, 10,800 feet; but is comparatively level towards the north, where the climate is milder than amongst the hills. There are extensive forests; iron, coal, and other minerals are wrought, and there are cloth manufactures. Area, 1890 sq. m. Pop. (1886) 237,619; (1921) 172,851; (1926) 167,498.—The river Ariège rises in the Pyrenees, and, after a course of 93 miles, falls into the Garonne near Toulouse.

Ariel, a man's name in the Old Testament, applied also to the city of Jerusalem by Isaiah. Gesenius, Ewald, and Fürst explain the word as 'lion of God,' but most of the ancient Jewish expositors as 'hearth of God.' In later demonology, it means a water-spirit. Thomas Heywood and Milton apply it to an angel. The literary currency of the name is due to Shakespeare's use of it in his *Tempest* as a name for a particular spirit of the air. At first in the service of the witch Sycorax, mother of Caliban, for his disobedience he is shut up by his mistress in the heart of a pine-tree. Prospero frees him after his imprisonment has lasted twelve years, uses his aid to raise storms, then lets him free into his native element.

A'ries, the Ram, one of the signs of the zodiac, including the first 30 degrees of the ecliptic measured from the vernal equinox, or that point where the vernal passage of the sun across the equator takes place. The vernal equinox, or, as it is also called, the first point of Aries, is constantly changing its position among the fixed stars, in consequence of the Precession (q.v.) of the equinoxes. Hence the sign Aries no longer corresponds with the constellation Aries, which was the case about two thousand years ago. The present sign Aries is in the constellation Pisces, about 30° west of the original sign. See ZODIAC.

Ar'il (*arillus*), a peculiar covering of the seed in some plants, formed by an expansion of the *funiculus* (the cord which attaches the ovule to the *placenta*). This expansion takes place after fertilisation, and sometimes invests the seed entirely, sometimes only partially. The succulent red cup round the seed of the yew is a familiar example, and the white water-lily, the passion flower, and the willow also form characteristic arils. Another accessory covering, often called the arillode, is developed from the edges of the *micropyle* (the aperture by which the pollen tube enters the ovule). This in the nutmeg forms what is called *mace*. In the spindle-tree (*Euonymus europœus*), it forms the remarkable orange-coloured covering of the seed. See OVULE.

Arimaspi, a fabulous people, supposed by the ancient Greeks to inhabit the most northern region of the world, near the Rhipæi Montes, which Ptolemy places on the site of the modern Ural Mountains. They are described by Herodotus in the fourth book of his History, as one-eyed and fierce, engaged in perpetual conflict with the neighbouring griffins for the gold hoarded by them.

Arin'os, a river in the south-west of Brazil, which, after a north-west course of 700 miles, joins the Tapajos, itself an affluent of the Amazon.

Ari'on, a celebrated lute-player of Methymna in Lesbos, about 600 B.C., regarded by the ancients as the inventor of the dithyrambic metre. Having fallen among robbers in returning to Corinth from Tarentum, where he had won the prize in a poetical contest, he threw himself into the sea after playing on his lute. A dolphin, charmed by his music, carried him on his back safely to shore. The lute and dolphin were placed among the constellations; and the story became a favourite theme with artists.

Ariosto, LUDOVICO, one of the greatest of Italian poets, was born at Reggio nell' Emilia, 8th September 1474, eldest son of the military governor of that city. He was bred to the law, but abandoned it for poetry. However, early in life he was compelled to exert himself for the support of a large family, left as a burden on him at the death of his father. His imaginative powers were developed in youth. In 1503, after he had written two comedies, with several lyrical poems in Latin and Italian, he was introduced to the court of the Cardinal Ippolito d'Este, who employed him in many negotiations, but was extremely niggardly in his rewards. Here, in Ferrara, in the space of about ten years, Ariosto produced his great poem, *Orlando Furioso*, which was published in that city in 1516, in forty cantos. When the cardinal left Italy (1518) the duke, his brother, invited the poet to his service, and acted to him with comparative kindness and liberality. In 1521 a second edition of his poems was published, the *Orlando Furioso* being still in forty cantos. Shortly after, he was commissioned by the duke to suppress an insurrection which had broken out in the wild mountain-district of Garfagnana; a task which seems more like a punishment than a mark of honour. Ariosto, however, succeeded in this arduous undertaking; and after remaining three years governor of the province, he returned to Ferrara, where he lived comfortably, nominally in the service of his patron, but in reality enjoying what he highly prized—an abundant leisure for prosecuting his studies. It was at this time that he composed his comedies, and gave the finishing touch to his *Orlando*. At length, in 1532, that poem made its appearance in a third edition, enlarged to its present dimensions of forty-six cantos. He now became seriously ill of a painful internal distemper, of which, after a few months of suffering, he died on 6th June 1533, in his 59th year. He was buried in the church of San Benedetto, at Ferrara, where a magnificent monument marks his resting-place. Ariosto is described in the Latin verses of his brother Gabriele as a man of noble personal appearance and amiable character. His *Orlando Furioso* is a romantic, imaginative epic, marked by great vivacity, playfulness of fancy, and ingenuity in the linking together of the several episodes. It takes its name and its theme from a chivalrous romantic poem by Boiardo (q.v.), the *Orlando Innamorato*. That poem treats of the wars between Charlemagne and the Saracens, confounded as they were by tradition with those of Charles Martel, wherein Orlando, or Roland (q.v.), stood forward as the champion of Christendom. Orlando is the hero of Boiardo's piece, and falls in love with Angelica, a clever and beautiful oriental princess, sent by the Paynim to sow discord among the knights of the Christian armies. The story being left unfinished in the *Orlando Innamorato*, is taken up by Ariosto, who makes the lady fall in love with an obscure squire Medoro, on which Orlando gets frenzied, and long continues in a state of insanity. Besides his great work, Ariosto wrote comedies, satires, sonnets, and a number of Latin poems. Of these, the sonnets alone show signs of the genius of Ariosto. His Latin poems are mediocre indeed, and his comedies, besides lacking interest, are disfigured by repeated immoral and licentious passages. Only the elegance of the diction, in which Ariosto always excels, and the spirited dialogue, serve to stamp their origin. In 1845 there was discovered the mutilated manuscript of a second epic, *Rinaldo Ardito*, describing, like the *Orlando*, the battles of Charlemagne and his paladins. It was ascribed to Ariosto, but its genuineness is at least doubtful. Of the *Orlando* there are many English translations: by Harrington (1607 and 1634), Croker

(1755), Huggins (1757), Hoole (1783), and Stewart Rose (1823). In the last only is there to be found a fair representation of the feeling and spirit of the original. One of Ariosto's comedies had been rendered into English by Gascoigne as early as the year 1566.

A list of over a hundred editions of the *Orlando*, and of lives of Ariosto, was published by Ferrazzi in 1881. See books by Gardner (1906), Nicholson (1914), Edwards (1924).

Ariovis'tus, a German chief who crossed the Rhine to help the Sequani in their struggle with the Ædui. Having gained a victory for the Sequani, he appropriated part of their territory, and soon swarms of Germans followed him into Gaul. The Sequani now joined the Ædui in imploring the help of Cæsar, who advanced to meet the Germans, and defeated them in a furious engagement, fought near Vesontium (Besançon), 58 B.C. Ariovistus, with only a few followers, escaped over the Rhine, and his subsequent history is unknown.

Arista. See AWN.

Aristæus, an ancient divinity whose worship in the earliest times was widely diffused throughout Greece, but whose myth is remarkably obscure. According to the common tradition, he was the son of Apollo and the nymph Cyrene, and was born near Cyrene, in Africa. Hermes placed the child under the protection of the Horæ, or of Chiron the Centaur. After Aristæus left Libya, he went to Thebes, in Bœotia, where he was taught by the muses the arts of healing and prophecy, and where he married Autonoë, the daughter of Cadmus, by whom he had several children, including Actæon (q.v.). At Ceos, he liberated the inhabitants from the miseries of a destructive drought. He visited the islands of the Ægean Sea, Sicily, Sardinia, and Magna Græcia, leaving everywhere traces of his divine benignity. In Thrace, he was initiated in the mysteries of Dionysus; and he disappeared from the earth near Mount Hæmus. Aristæus, always a beneficent deity, was especially worshipped as the protector of vine and olive plantations, and of hunters and herdsmen. The great diversities in the legend were probably caused by the fusion into one of separate but similar local divinities.

Aristarchus (1) OF SAMOS, a celebrated ancient astronomer, of the Alexandrian school, who flourished 280–264 B.C. He seems certainly to have anticipated Copernicus, maintaining that the earth moves round the sun. For this we have the testimony of Archimedes: he was even accused of impiety on this account. All his writings have perished, excepting a short essay on the sizes and distances of the sun and the moon (ed. Wallis, 1688; trans. Heath, 1913). In this he shows the method of estimating the relative distances of the sun and the moon from the earth, by the angle formed by the two bodies at the observer's eye at that moment when the moon is exactly half-luminous. The principle was accurate in theory; but the angle to be measured was too small, and the available instruments too imperfect to give accurate results.—(2) OF SAMOTHRACE, a very famous grammarian and critic, who flourished about 160 B.C. in Alexandria, where he educated the children of Ptolemy Philopator, and superintended the great library. His life was chiefly devoted to the elucidation and restoration of the text of the Greek poets—Pindar, the tragedians, and others, but especially Homer. The form in which we now have the Homeric poems preserved is in great measure owing to his judgment and industry. The strictness of his critical principles has made his name a proverbial expression for a severely just and judicious critic. He is said to have written 800 treatises, and founded a school of critics, some of whom have preserved fragments of his works. To escape the tyranny of his old pupil, Ptolemy VII. Physkon, he fled to Cyprus, where he died at the age of 72, of voluntary starvation on account of an incurable dropsy.

Aristeas. See SEPTUAGINT.

Aristi'des, surnamed 'THE JUST,' belonged to a good old Athenian family, and at the battle of Marathon (490 B.C.) was one of the ten leaders. Each of these was to hold the supreme command for one day; but Aristides, who saw the folly of the system, induced his companions to give up their claims, and make Miltiades commander-in-chief. Next year, Aristides was chief archon, and in this office, as in every other, secured the general respect of the citizens. About 483 the jealousy of his great rival Themistocles procured the banishment of Aristides. It is said that when an illiterate citizen, who did not know him personally, requested him to write his own name on the voting shell, he asked the man whether Aristides had injured him. 'No,' said the voter; 'but I am weary of hearing him always styled "the Just."' Aristides submitted to the sentence with dignity, praying the gods, as he left the city, that the Athenians might not have cause to repent of their decision. Only three years later came Xerxes' overwhelming invasion. He seems, however, by that time to have returned from banishment. On the eve of the battle of Salamis, Aristides, coming from Ægina, reported that the Greek fleet was hemmed in by that of the Persians. He did good service in that great sea-fight; and, as Athenian general, he divided with Pausanias the glory of Platæa (479). That he introduced a sweeping change into the constitution, by which all citizens, without distinction of rank, became eligible for the archonship is not now believed. Through him, Athens, not Sparta, became the ruling state of a maritime confederacy. He was an old man when he died (*c.* 468), and so poor that he had to be buried at the public cost.

Aristides, a 1st century Christian apologist, whose lost work was identified in 1890 with part of Barlaam and Josaphat (q.v.).

Aristip'pus, founder of the Cyrenaic school of Greek philosophy, was born at Cyrene, in Africa. Coming into contact with Socrates at Athens, he became his pupil, and remained with him almost up to the master's death, 399 B.C. He taught philosophy both at Athens and Ægina, and was the first pupil of Socrates to take money for his instruction. Aristippus passed a considerable part of his life in Syracuse, at the court of Dionysius, the tyrant, where he acquired the reputation of an elegant philosophic voluptuary. Plato says Aristippus was the only man he knew who could wear with equal grace both fine clothes and rags. Diogenes Laertius records a number of his sayings, which reveal a sharp, lively, and self-complacent nature. He lived some time at Corinth, in intimacy with the famous Laïs, but towards the close of his life he is supposed to have retired to Cyrene. He taught his leading doctrines to his daughter Arete, by whom they were communicated to her son Aristippus the Younger. The latter is supposed first to have systematised them, as it is more than probable that Aristippus published nothing during his life. He prided himself more upon spending his days in what he conceived to be a philosophical manner, than in elaborating a philosophical system for the benefit of mankind.

The Cyrenaic school, who carried out the doctrines of Aristippus to their legitimate conclusions, professed a great contempt for speculative philosophy and for physical and mathematical knowledge. They confined their investigations to morals, and formed an ethical system completely in harmony

with the gay, self-possessed, worldly, and sceptical character of their master. Its chief points were: (1) that all human sensations are either pleasurable or painful, and that pleasure and pain are the only criterions of good and evil; (2) that pleasure consists in a gentle, and pain in a violent motion of the soul; (3) that happiness is simply the result of a continuous series of pleasurable sensations; (4) that actions are in themselves morally indifferent, and that men are concerned only with their results. The great philosophic sensualist stood out in strong relief against the gloom and austerity of Antisthenes and the Cynic school. The doctrine that makes pleasure the chief good is often called *Hedonism* (from Gr. *hēdonē*, 'pleasure').

Aristobu'lus, an Alexandrian Jew and peripatetic philosopher, who lived about 170 B.C., was considered by the early fathers as the founder of the Jewish philosophy in Alexandria. He is said to have been the author of an allegorical commentary on the books of Moses, which showed that the oldest Greek writers borrowed from the Hebrew Scriptures; but it is now admitted that this work was written by a much later writer.—For the Hasmonean or Maccabee princes of this name, in 106 B.C. and 64 B.C. respectively, see JEWS.

Aristo'cracy (Gr. *aristocratia*, from *aristos*, 'best,' and *kratos*, 'power') means etymologically the power or government of the best men. As used by Plato and Aristotle, it meant the government of a class, whose supremacy rested not on wealth alone, but on character and personal distinction. In point of fact, that class was a privileged one, consisting of the leading families, in which wealth and good-breeding were hereditary, and which long experience had trained to a habit of command. In an aristocracy, it was implied that the government of affairs should be for the public good, and not in a class interest. Oligarchy was a degenerate phase of aristocracy, in which the rule of the minority was founded on wealth, and conducted in its own narrow interests. Almost all countries have passed through a stage in which government has been in the hands of a privileged class, which may be called an aristocracy (when the class is markedly small in numbers, and narrow in spirit and policy, such rule is generally called an oligarchy). So it was in ancient Rome, and in the Italian states of the middle ages. In most of the European states, noble families have been powerful, at certain periods co-ordinate with the royal power, and even effacing it. The absolute states of modern times were based on the subordination of the noble families to the royal power. The king and aristocracy more recently combined to resist liberalism or constitutionalism. In modern English history, especially after the revolution of 1688, the government was really an aristocratic one for about a century and a half. That is to say, for that period the ruling power consisted of the noble families, only very partially controlled by the king or limited by the industrial class. The aristocratic element, still influential in most European countries, was (before the Great War) strongest in Prussia. The rights of the hereditary peers to constitute the second chamber in the British parliament were keenly disputed in and after 1910. See DEMOCRACY, GOVERNMENT.

Aristogeiton. See HARMODIUS.

Aristolochia, a genus in the dicotyledonous family Aristolochiaceæ, including many herbs and shrubs (frequently climbers), specially abundant in tropical South America. Its affinities are obscure, owing to the peculiarly aberrant structure of its flowers: the tubular oblique perianth, dilated at its base, and the stamens adherent to the stigmas, are especially remarkable, and these characters are associated with a no less peculiar mode of fertilisation. The fertilising insects (usually small flies) attracted by the expanded and coloured lip of the perianth, as well as by the frequently powerful and fetid odour, descend the narrowed perianth tube into the dilated base. Thence they are prevented from returning by the downward-directed hairs, with which the perianth tube is lined; these, however, wither when the stamens are fully matured, and the flies escape, dusted with pollen,

Aristolochia Clematitis:
a, flower on larger scale; *b*, section of flower.

to enter another flower, and there become again imprisoned until after they have had abundant time to fertilise the stigmas, and acquire a new load of pollen in their efforts to escape. Several species of Aristolochia are found in the south of Europe; one only, the common Birthwort (*A. Clematitis*), occurs upon the Continent as far north as about lat. 50°, and is a doubtful native of England. The family is, however, also represented in Britain by *Asarum europæum*, or Asarabacca (q.v.). It has a long branching root, with an unpleasant taste and smell, which, with the roots of *Aristolochia rotunda* and *A. longa*, two herbaceous species, natives of the south of Europe, was formerly much used in medicine, being regarded as of great service in cases of difficult parturition, whence the name (Gr. *aristos*, 'best,' and *locheia*, 'childbirth'). These roots possess powerful stimulating properties, and those of the southern species are still used as emmenagogues. The root of *A. indica* is used in the same way by the Hindus.—*A. Serpentaria*, Virginian Snakeroot, is a native of most parts of the United States, growing in woods. The root has long been a fancied remedy for the bite of the rattlesnake. It possesses stimulant and tonic properties.—Its reputation as a cure for serpent-bites is shared by other species, particularly *A. anguicida* and *A. maxima* (one of the plants called Guaco) natives of the warmer parts of America; and it is said that a number of species are used by Egyptian jugglers, in order to their handling serpents with impunity.—*A. Sipho*, a climbing shrub, of 15 to 20 feet in height, a native of the southern parts of the Alleghany Mountains, is frequently planted to form shady bowers, on account of its very large heart-shaped leaves (a foot in breadth), of a beautiful green. From the bowl-shaped base of its perianth, the plant has also received the name of Pipe-shrub, Pipe-vine, or Dutchman's Pipe.—

Tropical species are distinguished for their beauty and the peculiar forms or gigantic size of their flowers, and are frequently cultivated in our hot-houses. *A. Goldieana* from Old Calabar is said to have the biggest known flower after the Sumatran Rafflesia.

Aristoph'anés, the greatest of Attic, if not of all, comedians, was born about 448 B.C. His father held property in Ægina, which explains the poet's allusion (*Acharnians*) to the claim of that island by the Spartans, in order to secure him, and also his prosecution by Cleon on the charge of usurping civic rights. Of his personal history we have nothing recorded, except his deme and tribe, and that he had three sons—Philippos, Araros, and Nikostratos—all comic poets. The old comedy, of which Aristophanes is to us the representative, exercised an influence akin to that of the public press of our day in pamphlets and newspaper articles; it claimed to be guardian and censor of public morals, and the critic of current events. During the sixty years in which it flourished under the Athenian democracy, its distinctive feature was its plain-spoken and personal character. Full license for riotous fun and banter was given it by the season of its exhibition—viz. the Dionysiac festival. Its shafts were chiefly aimed at radical tendencies and novelties of any kind. Its plots were political burlesques; its famous *parabases* were addresses of the chorus to the audience, explaining its views on subjects of the moment—somewhat like the topical song in our pantomimes. Aristophanes is said to have written fifty-four plays, but eleven only are extant, which may be ranged under the categories of political, philosophical, social, and literary; and again under three periods, ending respectively 425, 406, and 388 B.C., about which last date he died. To the first period belong (1) the *Acharnians*, (2) the *Knights*, (3) the *Clouds*, (4) the *Wasps*, the poet's four masterpieces, named from their respective choruses, and (5) the *Peace*, in all of which full rein is given to political satire. To the second, (6) the *Birds*, (7) the *Lysistrata*, (8) the *Thesmophoriazusæ*, (9) the *Frogs*, in which we find less political rancour, and more reticence and caution. To the third, the *Ecclesiazusæ* and *Plutus*, comedies of a tamer type, known as that of the middle comedy, in which political allusions and the distinctive characteristic of the old comedy, the *parabasis*, disappear.

Aristophanes made his debut with the *Revellers* (427 B.C.), in which the teaching of the Sophists, then becoming fashionable, is contrasted with the simplicity of the old education. It was followed by the *Babylonians*, a satire on the various magistracies in Athens, which contained incidentally a preliminary attack on Cleon, one of his *bêtes noirs*, to which the poet alludes in his next year's play, the *Acharnians* (425 B.C., the seventh year of the Peloponnesian war). This was brought out, as were also the other two, in the name of Kallistratos. In this, the first of his eleven extant plays, Aristophanes pleads the cause of the aristocratic peace-party against the democratic war-party, whose selfish aims and place-hunting, disguised under the cloak of patriotism, he exposes with unsparing ridicule. Dikaiopolis, an honest farmer, concludes a peace for thirty years between himself and family on the one side, and the Spartans and their allies on the other, and keeps the rural Dionysia after six years' interval. The old charcoal-burners of Acharnai, who will not hear of peace, because their lands have been ruined by the Spartan invasion, attack him; but he pleads the enemy's cause, and converts half the chorus to his view, while the malcontent half fetch the swash-buckler general Lamachos to overawe the traitor. Dikaiopolis holds open market with the sworn enemies of Athens, and enjoys himself in the midst of his good cheer, while Lamachos is depicted in piteous flight and mortal pain, after the hardships of campaigning.

The *Knights* (424 B.C.) was the first play produced in the poet's own name. It is aimed entirely at Cleon the tanner, the most prominent demagogue of the day, whose success at Pylos was a bitter disappointment to his opponents. Demos, the Athenian John Bull, is a cross, dull-witted, and superstitious old man, who has intrusted the management of his household to a bullying Paphlagonian slave (Cleon). Two of his fellow-slaves (Demosthenes and Nicias) conspire against his tyranny, with the Knights, who represent the richer classes of Athens, and contrive that he shall be supplanted by a sausage-seller. Demos is then renovated by being boiled, and becomes youthful and sensible once more.

The *Clouds* (423 B.C.) is a protest against the growing spirit of scepticism at Athens, where it was becoming the fashion for youths to frequent the new schools of the Sophists. To the conservative instincts of Aristophanes this was bitter gall, and he ridiculed the whole profession with Socrates at their head. The latter, by his ungainly personality and eccentric habits, was a good subject for caricature; but Aristophanes' picture is no truthful portrait of the great philosopher, one of whose chief aims and merits was to expose shams.

Strepsiades is being ruined by his spendthrift son Pheidippides (Alcibiades). His only chance of safety is to send his son to the 'Phrontistery' or *Pensoir* of Socrates, where he will learn to make the worse appear the better reason, which his creditors unfortunately hold. The son bluntly refusing, the father goes himself, but proves too stupid and forgetful to learn; so the son reluctantly enters the school, and learns the worse reason with a vengeance. In the famous dialogue between the Just and the Unjust Argument, the latter wins the day, and so obtains the control of the pupil, who is imbued with the new ideas so thoroughly, that, at a feast given him by his father on his return home, he sings an immoral speech from Euripides, beats his father, and justifies the act by his newly learned sophistry. The eyes of the old man are opened, and he wreaks his vengeance on Socrates by setting the *Pensoir* and its inmates on fire.

The *Clouds* is unequalled in ancient comedy for simplicity and perfection of plot, and morality of tone. It is the nearest approach to a modern French play; it exhibits the development of a possible action and real characters, and not merely a string of comic situations. In repartee it is not excelled by any play of Molière, and Shakespeare at his best shows no richer humour.

The *Wasps* (422 B.C.), of which Racine's one comedy *Les Plaideurs* is an imitation, is a counterpart of the *Clouds*, in which a father converts his son, while in the *Wasps* a son reforms his father. The two principal characters are Philocleon, an old dikast, and his son Bdelycleon, who tries to cure his father of his mania for sitting in the court, and gets up for him a mock trial of a dog at home. In the latter half of the play, the vulgar element predominates; it represents Philocleon's conversion to the ways of society, but he behaves unexpectedly with more than the license of youth.

The *Peace* (421 B.C.) may be called a leading article in favour of the Peace of Nicias, when both Cleon and Brasidas were dead. The first half of the play represents the recovery of Peace from heaven, whither Trygæos had gone on a beetle's back to fetch her; the second, the social enjoyments which welcome her restoration to the earth. Its hearty humour, its beautiful descriptions of rural life and its pleasures, are inimitable.

The *Birds* (414 B.C.) is a brilliant pantomime. Its aim is vague if looked on as a satire. It was composed at a period of great excitement, when Athens was in the fever-heat of preparation for the Sicilian expedition, and Alcibiades was in every mouth, but it was not produced until eight months afterwards. Peithetairos (Alcibiades) and his friend Euelpides start a scheme for making the birds build a city (Cloud-cuckoo-town) in mid-air, and establish their sovereignty, so as to shut off the gods, and intercept men's offerings to them. The gods submit and allow Basileia, daughter of Zeus, to be married to Peithetairos.

The *Lysistrata*, or 'Strike of the Wives' (411 B.C.), exhibits the women of all Greece taking the question of war into their own hands, and refusing their lords their rights until they consent to make peace.

The *Thesmophoriazusæ*, the most diverting of all Aristophanes' plays, was brought out three months later. It contains an attack on the morality of Athenian women and on Euripides; it does not interfere in politics.

The *Frogs* (405 B.C.) is a literary criticism. The first part contains the adventures of Dionysos on his journey to Hades in search of a good poet, Sophocles and Euripides being just dead; the second, the poetical contest between Æschylus and Euripides, and the victory of the former.

In the *Ecclesiazusæ* (393 B.C.), or 'Ladies in Parliament,' Aristophanes satirises the communistic theories which were afloat, by making the women occupy the Pnyx, disguised as men, and decree a new constitution with full community of property and wives. The play is remarkable for its witty repartee.

The *Plutus* (388 B.C.) is unique among Aristophanes' plays. It is a satire on humanity; its subject, the unjust distribution of wealth, the cause of which is the blindness of Plutus. His sight is restored to him by Asklepios, and then matters are righted; the god bestows his favours only on the deserving, to the ruin of many evil trades.

The choruses are the part of his work on which Aristophanes lavished the greatest wealth of his exuberant fancy. A study of these will give an idea of the varied resources of his genius, passing with prodigious fullness of the most comical fancies to the most charming descriptions, such as recall the idyllic grace of Theocritus, and to the most sublime conceptions.

The first printed edition of Aristophanes was the Aldine (Venice, 1498); it contains nine plays. Junta (1515) added two. See editions by Brunck (1783), Bekker, Dindorf, Bergk, Meineke, Blaydes, Holden, van Leeuwen (1893 *et seq.*), Hall and Geldart (1906-7); of single plays by Kock, Merry, Neil, Rennie, Starkie; Rutherford's *scholia* on the Ravenna MS. (the oldest; 1896-1906); translations by Mitchell (4 plays, 1822), J. H. Frere (5 plays, 1847), Walsh, Kennedy, Tyrrell, B. B. Rogers (with revised text, 1852-1911; new ed. 1924).

Aristote'lia. See MAQUI.

Ar'istotle was born at Stagira (Stageira), a Greek colony on the Macedonian peninsula Chalcidice, in the year 384 B.C. He belonged to a family in which the practice of physic was hereditary. His father, Nicomachus, was the friend and physician of Amyntas II., king of Macedonia, father of Philip, and grandfather of Alexander the Great. Aristotle lost both parents while he was quite young, and was brought up under the care of Proxenus, a citizen of Atarneus, in Asia Minor, who was then settled at Stagira It is to be conjectured that his education would take the direction of preparing him for the family profession. In after-life, he occupied himself largely in the dissecting of animals, and was acquainted with all the facts that had been derived from this source by others before him. It seems probable, however, that he early abandoned the intention of following physic as a profession, and aspired to that cultivation of universal knowledge for its own sake, in which he attained a distinction without parallel in the history of the human race.

In his 18th year (367 B.C.) he left Stagira for Athens, then the intellectual centre of Greece and of the civilised world. Plato, on whom he doubtless had his eye as his chief instructor, was then absent at Syracuse in that extraordinary episode of his life, connecting him as political adviser with the two successive Syracusan despots—Dionysius the Elder, and Dionysius the Younger—and with Dion. Aristotle, therefore, pursued his studies by books, and by the help of any other masters he could find, during the first three years of his stay. On the return of Plato, he became his pupil, and soon made his master aware of the remarkable penetration and reach of his intellect. We are told that Plato spoke of Aristotle as the 'intellect of the school.' Unfortunately, there is a total absence of precise information as to the early studies of the rising philosopher. He remained at Athens twenty years, during which the only facts recorded, in addition to his studying with Plato, are, that he set up a class of rhetoric, and that in so doing, he became the rival of the celebrated orator and rhetorical teacher, Isocrates, whom he appears to have attacked with great severity. It was in the schools of rhetoric that the young men of Athens got the principal part of their education for public life. They learned the art of speaking before the Dikasteries, or courts of law, and the public assembly, with efficiency and elegance; and incidentally acquired the notions of law and public policy that regulated the management of affairs at the time. We can easily suppose that Aristotle would look with contempt upon the shallowness—in all that regarded thought or subject matter—of the common rhetorical teaching, of which, doubtless, the prevailing excellence would lie in the form of the address, being artistic rather than profound or erudite. One of the disciples of Isocrates, defending his master against Aristotle, wrote a treatise wherein allusion is made to a work (now lost) on proverbs, the first recorded publication of the philosopher.

The death of Plato (347 B.C.) was the occasion of Aristotle's departure from Athens. It was not extraordinary or unreasonable that Aristotle should hope to succeed his master as the chief of his school, named the Academy. We now know that no other man then existing had an equal title to that pre-eminence. Plato, however, left his nephew Speusippus as his successor. We may suppose the disappointment thus arising to have been the principal circumstance that determined Aristotle to stay no longer in Athens; but there are also other reasons that may be assigned, arising out of his relations with the Macedonian royal family at a time when the Athenians and Philip had come into open enmity.

Whatever may be the explanation, he went in his thirty-seventh year, after a stay of nearly twenty years in Athens, to the Mysian town of Atarneus, opposite to the island of Lesbos. Here he lived with Hermeias, the despot of the town, a man of singular energy and ability, who had conquered his dominion for himself from the Persians, at that time masters of nearly all Asia Minor. Aristotle had taught him rhetoric at Athens, and he became in return the attached friend and admirer of his teacher. For three years the two lived together in the stronghold of Atarneus until the death of Hermeias at the hands of a treacherous enemy. Aristotle took refuge in

Mitylene, the chief city of Lesbos, taking with him Pythias, the sister or niece of Hermeias, whom he made his wife. In a noble ode he has commemorated the merits of his lost friend. His wife, Pythias, died a few years afterwards in Macedonia, leaving him a daughter of the same name. His son, Nicomachus—whose name, for whatever reason, has been given to the chief of the ethical writings that have come down to us among the works of Aristotle, the *Nicomachean Ethics*—was born to him at a later period of his life by a concubine.

After two years' stay at Mitylene, he was invited (in the year 342 B.C., age 42) by Philip to Macedonia, to educate his son Alexander, a boy of thirteen, who for at least three years was the pupil of Aristotle. The two parted finally when Alexander set forth on his expedition into Asia (334 B.C.), and Aristotle came from Macedonia to Athens, having recommended to the future conqueror, as a companion in his campaigns, the philosopher Callisthenes, whom he had educated along with Alexander. Now at the age of 50, he entered on the final epoch of his life; he opened a school called the 'Lyceum,' from its proximity to the temple of Apollo Lyceius. His followers came to be called the *Peripatetics*, either from his practice of walking up and down in the garden during his lectures, or because the place was known as 'The Walk' (*Peripatos*). The tradition that it was his habit to give a morning lecture to select pupils on the more abstruse subjects, and one in the evening of a more popular kind to a general audience, is based upon a mistake. This crowning period of his life lasted twelve years. After the death of Alexander, the anti-Macedonian party at Athens obtained the ascendency, and among other consequences, an accusation was prepared against Aristotle, the pretext being impiety. With the fate of Socrates before his eyes, he chose a timely escape, and in the beginning of 322 B.C., took refuge at Chalcis in Eubœa, where, in the autumn of the same year, he died, aged 62. He had long been afflicted with indigestion, and ultimately sank under this malady.

Many of the details recorded of Aristotle's life, coming as they do from late and very uncritical authorities, must be considered uncertain; but the foregoing account may be accepted as in the main correct.

Of the numerous writings which have come down to us under the name of Aristotle, some are undoubtedly not his; some may be the products of his school, though not the direct work of the master himself. Even of his most famous and undisputed works, the structure is so irregular, and the style so unequal, that it has been with great probability supposed that they are to a large extent not finished writings, but notes and rough jottings edited by disciples, sometimes perhaps more reverent than judicious. There is indeed a story told by Strabo the geographer, who lived in the time of Augustus, that the works of Aristotle were *first* collected and edited by Andronicus of Rhodes (70 B.C.). How far this may account for the condition of 'our Aristotle' is a matter of dispute among scholars. We hear (e.g. from Cicero) of Dialogues written by Aristotle. Of these only a few unimportant fragments remain. They were probably written whilst he was still Plato's pupil. Those works which we possess all belong, apparently, to the last twelve years of his life (though the materials for them may have been collected previously), and it is therefore likely enough that many of them were left unfinished at his death. The commentaries written on some of these works by ancient scholars (e.g. Alexander of Aphrodisias, Themistius, Philoponus, Simplicius) during the early centuries of the Christian era, form of themselves a great mass of literature.

In the middle ages, Aristotle's philosophy became known to the learned in the Western Church, at first mainly through Arabian translations, which in their turn were translated into Latin. The Arabian philosophy (of Avicenna, 1000 A.D., and Averroës, 1150 A.D.) was based upon Aristotle, with the addition of Neoplatonic elements. At the time when what was supposed to be the Aristotelian system was (especially through the influence of Thomas Aquinas, died 1274 A.D.) dominant in Western Europe, Aristotle's works were hardly known to any one in the original; nor could they have been appreciated in an unscientific age. The Aristotelianism which the medieval schoolmen admiringly followed, and which, at a later time, Bacon and others as blindly attacked, was very different in spirit from the real philosophy of Aristotle. For the history of Aristotelianism in the middle ages, see SCHOLASTICISM.

The method and system of Aristotle are frequently supposed to be in complete contrast to those of his master Plato. It is said 'Plato was an idealist, Aristotle an empiricist,' &c. This is misleading: the difference is great in appearance mainly; and this appearance is partly due to Aristotle's habit of criticising Plato very severely, though, on the whole, the relation between the two philosophers has been well expressed by Sir Alexander Grant's phrase that 'Aristotle *codified* Plato.' There is certainly a great difference in temperament between them, and a very great difference in literary manner. Plato was a poet, and is always an artist, as well as a thinker, in his Dialogues. Aristotle, with the education of a physician, has the mental habits and tendencies of the man of science predominant; and while lacking Plato's inspiration and enthusiasm, has a wider, in fact, an all-embracing range of interests, and cares more for actual facts for their own sake. He appears to have projected what may be called an Encyclopædia of Philosophy, though the scheme is only imperfectly carried out in his works.

Aristotle distinguishes three kinds of thinking: (1) Theoretic; (2) Practical; (3) Productive. Corresponding to these we have three divisions of Philosophy: (1) Theoretic Philosophy is subdivided into (*a*) First Philosophy or Theology; (*b*) Mathematics; (*c*) Physics—i.e. the Philosophy of Nature. (2) Practical Philosophy is subdivided into (*a*) Ethics; (*b*) Œconomics (i.e. the practical science of household management, to which *Chrematistic*, the science of wealth, is only a subordinate science); (*c*) Politics. (3) *Poetic* (Productive) Philosophy, corresponding to what we should call the Philosophy of Art, would apparently be subdivided according to the different arts (painting, sculpture, poetry), but Aristotle has not specially treated of any branch except poetry.

Logic, which Aristotle himself calls 'analytic,' does not form a division of philosophy, but is rather a study of the *method* of scientific proof (which aims at truth). The term 'logical' Aristotle applies specially to dialectical argument (which aims at refutation of opponents). Aristotle's followers held (in opposition to the Stoics, who divided all philosophy into logic, physics, ethics) that logic was not a part of philosophy, but its 'instrument' (*Organon*). Hence this name was given to the Aristotelian treatises on the subject. In the subsequent history of the science, the most influential of these treatises have been the *Categories* (containing the famous list of ten classes of predicates, substance, quality, quantity, &c.) and the *Prior Analytics* (containing the doctrine of syllogistic moods and figures); but for

the student of Aristotelian philosophy the most important is the *Posterior Analytics*, which contains his theory of knowledge and of scientific method. The defects which modern logicians have found in the Aristotelian logic are due mainly to the fact that the only science which in his day had reached a sufficiently advanced stage to have its method fairly analysed was the science of geometry. The analysis of its methods could hardly furnish an adequate account of the processes of reasoning in the less abstract sciences of nature. Formal deductive logic has hardly undergone any important modifications since Aristotle's time; but the so-called Aristotelian logicians have often had little enough of Aristotle's scientific spirit. Aristotle himself boasts with truth that in working out the theory of reasoning (*syllogism* is only the Greek term for 'reasoning' or 'inference') he had no predecessors.

In the *Rhetoric*, Aristotle deals with the art of persuasion. In this subject he had predecessors; but most subsequent treatises have added little to what he has said. This work, though usually classed along with the *Poetics*, since both deal with literature, may also be properly connected with the logical writings, the longest of which, the *Topics*, deals with dialectical argument and reasoning from probabilities.

The name *Metaphysics* (i.e. 'after the Physics') was given to Aristotle's discussions on 'first philosophy,' because they were placed by his editors *after* his books about nature. The work is in a very confused condition, and is in consequence extremely difficult. It begins with a sketch of preceding Greek philosophy, leading up to a criticism of Plato's doctrine of 'ideas' or universals. In opposition to Plato, Aristotle insists that reality is to be found only in individual things, each of which is a combination of *Form* (the universal element) and *Matter;* but his own doctrine, that knowledge can only be of universals, is the same as Plato's, though stripped of Plato's paradoxical modes of expression. His most important advance beyond Plato consists in his thoroughgoing application of the distinction of the *potential* and the *actual*. Actuality (realisation) and potentiality correspond to form and matter respectively, but the former terms are dynamical, the latter statical. All being he regards as a continuous ascending scale from mere matter (about which, because it is quite destitute of form, we can say nothing) up to the pure actuality, or 'thought thinking itself,' which he calls God. (Hence the name Theology also given to the 'first philosophy'—'first,' because it deals with the highest and ultimate problems of being.) Any individual object is intermediate between these two extremes, though at different stages—e.g. a block of marble is less formed, less actualised, than the statue made of it. In trying to understand or explain any individual object, we must consider it in four ways: (1) What are the material conditions of its existence? (2) What is its form or essential character as formed or realised? (3) Through what agency does it come into being? (4) What is the end or result attained by it? This is the famous doctrine of the 'Four Causes,' called respectively material, formal, efficient, final.

The books called the *Physics* deal mainly with what we should call the metaphysical aspects of movement (under which conception Aristotle includes growth and qualitative change), time, place, &c. Aristotle's application of his speculations about motion to a theory of the physical universe, exercised a bad influence (especially in the case of astronomy) on those whose admiration led them to accept his opinions as unquestionable dogmas.

The subject of mathematics he does not expressly treat himself, that science having already become sufficiently specialised and separated from the other departments of human thought. His works on Animals, though now possessing only an antiquarian interest, prove him to have been a close and acute observer of nature so far as, in the absence of all scientific aids to observation, his limited opportunities went; nor did he, as often alleged, neglect experiment, though doubtless not fully aware of its importance. Many modern biologists have been ready to bear testimony to the genuinely scientific character of his observations; and, indeed, his metaphysical theory provided him with an evolutionary conception of nature such as has only been recovered in recent times. His book *On the Soul* is as much a biological as a psychological treatise (for 'soul' means for him the vital principle in plants and animals, of which the thinking human soul is only the highest stage); yet in this treatise he may be regarded as the founder of psychology as a distinct science. In one of his shorter treatises, which deals with memory, he gave a first statement of the law of association of ideas.

His *Ethics* and *Politics*, though apparently less studied, at least less commented on, in antiquity than his other works, have in medieval and modern times exercised an enormous influence. Thus his conceptions of the various virtues and vices have, because of their adoption by St Thomas Aquinas and other medieval doctors, passed into European literature—e.g. in Dante, Spenser, &c. At the revival of letters, and at the Reformation, when antipathy to medieval theology caused a general disparagement of Aristotle's philosophy, Aristotle's *Politics* exercised a direct influence on the rise of modern political philosophy; it even helped to keep alive ideals of political liberty in an age when rulers were becoming more absolute and despotic. Aristotle is said to have made a collection of 158 'Constitutions,' as a preparation for writing his *Politics:* of these the most important was the *Constitution of Athens* (see below). The *Œconomics* are not considered to be a work of Aristotle's own. His observations on the subject are to be found in Book I. of the *Politics*. In his remarks on *Chrematistic* (*Pol.* i. 8–11) are to be found the first germs of the science now called 'Political Economy.'

The *Poetics* is an incomplete work, and contains little more than a discussion of tragedy; but even so, few, if any, books on literary criticism have had more influence—and here, as elsewhere in the case of Aristotle, partly through misunderstandings. The famous doctrine of 'the three dramatic unities' is not in the *Poetics*. Only the unity of plot is insisted on by him.

The great edition of Aristotle is still that of Bekker (Berlin, 1831–40), which includes Latin translations, *scholia* edited by Brandis, and a complete index by Bonitz. Aristotle is now generally quoted by scholars according to the pages, columns, and lines of this edition. Bekker's text has been reprinted at Oxford (1837; 11 vols. 8vo). The best edition of the ancient commentaries is that published at Berlin in 25 vols. In Germany there has been a great succession of Aristotelian scholars, who have edited, translated, and expounded portions of his writings—e.g. Bonitz (ed. *Metaph.*), Schwegler (ed. and trans. *Metaph.*), Trendelenburg (ed. *De An.*), Torstrik (ed. *De An.*), Waitz (ed. *Organon*), Susemihl (ed. and trans. *Politics;* ed. *Ethics*), Biehl (ed. *De An.*), Blass (ed. *Constit. of Athens*), Dittmeyer (ed. *Hist. Anim.*), &c. Prominent French commentators have been Cousin, Ravaisson, Barthélemy Saint-Hilaire. A complete English translation, edited by Smith and Ross, was begun in 1909 (11 vols. Oxford). The *Nicomachean Ethics* was edited by Sir A. Grant (3d edition 1874), Bywater (1890), Burnet (1900), and translated by Welldon (1892), Peters (new ed. 1906), Ross (1925). The *Politics* was edited by New-

man (1887–92), translated by Jowett (1885), and by Welldon (1888). The *Rhetoric* was edited by Cope (1877) and translated by Jebb (1909). The *Poetics* has been translated by Bouchier (1906), edited and translated by Bywater (1898–1909), and edited and translated, and discussed by Butcher in *Aristotle's Theory of Poetry and Fine Art* (1895). The *De Anima* has been translated and edited by Wallace (1882), and Hicks (1907). Poste's translation of *Post. Anal.* and edition of *Soph. Elench.*, the translation by Ogle of the *Parts of Animals*, by Ross of the *Metaphysics*, by d'Arcy Thomson of the *Historia Animalium* may also be named. The *Constitution of Athens*, of which only fragments had been known, was discovered almost complete in a papyrus from the Fayum in the British Museum, of which text, fac-simile and translation were published by Kenyon in 1891 (new ed. 1914). The elaborate edition by Sandys (1893) accepts the text as mainly the work of Aristotle himself, but others have tried to make out that it is mainly the work of a pupil; see SOLON. See the general works on Aristotle by Grote (1872), Grant (1877), Siebeck (in Ger. 1902), Taylor (1906, 1919), Ross (1923). See also Bénard (in Fr. 1887) for æsthetics; Wilamowitz-Möllendorff (in Ger. 1893), for the *Constit. of Athens;* Wallace (1883) for philosophy; Oncken (in Ger. 1870), Barker (1906) for the *Politics;* Prickard (1891) for the *Poetics;* Wilson (1879; new ed. 1912), Stewart (1892), Muirhead (1900) for the *Ethics.* Other German Aristotelian scholars are Spengel, Teichmüller, Diels, Vahlen. Gomperz and Zeller on Greek philosophy are indispensable.

Aristotle's Lantern. See SEA-URCHINS.

Aristox'enus OF TARENTUM, a pupil of Aristotle, and writer upon music, flourished about 350 B.C. His *Elements of Harmony* was edited by Marquard (Berlin, 1869), and translated by Macran (1902). See Study by Williams (1911).

Arith'metic is the science that treats of numbers (Gr. *arithmos*). It is sometimes divided into theoretical and practical; the former investigating the properties of numbers and their combinations, the latter applying the principles so established, in the form of rules, to actual calculations. Some restrict the term arithmetic to this art of reckoning, assigning the investigation of the principles to analysis. Anciently the science of reckoning was usually called *logistic;* while arithmetic dealt with forms of numbers, primary numbers, &c.

Arithmetic is said to have been first developed into a science in India; the Egyptians reckoned the god Thoth the first teacher of numeration. Among the ancient Greeks and Romans, arithmetic made little progress, owing to their clumsy modes of notation. Few of their writings on the subject have come down to us; the most important are those of Euclid, Archimedes, Diophantus, and Nicomachus. After the introduction of the decimal system and the Arabic or Hindu numerals (see NUMERALS), about the 11th century, arithmetic began to assume a new form. Early in the 13th century, Sacro Bosco wrote his *Algorithmus seu Arithmeticæ Introductio;* Pacioli wrote in the 15th century; and in the 16th, Adam Riese and Apianus. It was not till the 16th century that the Double Rule of Three, or Compound Proportion, was discovered, and decimal fractions were introduced. The invention of Logarithms in the 17th century is the last great step in advance that the art has made. The elementary operations in Arithmetic are Addition, Subtraction, Multiplication, and Division. The subjects of Fractions, Decimal System, Practice, Proportion, Logarithms, Interest, Discount, Involution and Evolution, will be noticed in their proper places. Annuities, Averages, Insurance, Mensuration, and Partnership give rise to branches or special applications of arithmetic. The various methods of Notation and the forms of the numerals employed by the Greeks, Romans, and other nations, are separately treated at Scales of Notation and at Numerals. The theory of Numbers (q.v.) is a subject cognate to arithmetic. See also ALGEBRA and ANALYSIS. Contrivances such as the Abacus, the Calculating Machine, and Napier's Bones, are treated under their own heads.

Arithmet'ical Mean is that number that lies equally distant between two others: thus, the arithmetical mean between 11 and 17 is 14, which is found by taking half their sum.

Arithmetical Progression is a series of numbers that increase or diminish by a common difference, as 7, 10, 13, 16, 19, 22; or, 12, 10½, 9, 7½, 6. To find the sum of such a series, multiply the sum of the first and last terms by half the number of terms. The series of natural numbers, 1, 2, 3, 4, &c. form an arithmetical progression, of which the difference is 1.

Arithmetical Signs are arbitrary marks or symbols used to denote the operations to be performed on numbers, or the relations existing between them. The sign of Addition is +; of Subtraction, −; of Multiplication, ×; of Division, ÷; of Equality, =. De Morgan, followed by Stokes and others, introduced for division the convenient symbol /; thus, 18/3 has the same meaning as 18 ÷ 3 or $\frac{18}{3}$. The same signs as in Arithmetic are also used in Algebra; and an enumeration and explanation of them may be found in almost any treatise on either subject.

A'rius (Gr. *Areios*), the celebrated founder of Arianism, was a native of Libya, and is generally supposed to have been born shortly after the middle of the 3d century. About the year 306 A.D., Alexandria was thrown into confusion by the violence of its religious disputes, and in these Arius was largely concerned. At first, he took part with Meletius, Bishop of Lycopolis, in Upper Egypt, a man who was strenuously opposed to certain notions of discipline entertained by Peter, Bishop of Alexandria. He was excommunicated by Peter in consequence; but the latter dying soon after, Achillas, his successor, restored him to his office, and even advanced him to the dignity of a presbyter, 313. Arius was first brought into collision on a point of doctrine with his ecclesiastical superiors in 318. Alexander, the successor of Achillas, having in a public assembly of clergy, while speaking of the Trinity, said that it contained one single essence, or indivisible unity of substance, Arius alleged that such a conception was impossible to the human mind, and accused Alexander of Sabellianism—i.e. of destroying the distinction of persons. In maintaining his ground, Arius went beyond his first statement of the absolute distinctness of person between the Father and the Son; he maintained that the Son was not co-equal or co-eternal with the Father, but only the first and highest of all finite beings, created out of nothing by an act of God's free-will, and that he ought not to be ranked equal with the Father.

Arius was successful in securing the adherence of large numbers both of the clergy and laity in Egypt, Syria, and Asia Minor. In 321 a synod of bishops at Alexandria deposed and excommunicated him. To escape persecution, he retired to Palestine, whence he wrote a letter to his friend Eusebius, Bishop of Nicomedia. Eusebius warmly sympathised with him; wrote in his behalf to Paulinus, Bishop of Tyre, and others; absolved him from the Alexandrian synod's excommunication; and in 323 convened another synod in Bithynia, which pronounced favourably on Arius. While Arius was residing at Nicomedia, he wrote a theological work in verse and prose, called *Thaleia*, some fragments of which remain. The *Thaleia* is said to have been sung by the Arian neophytes, who thus kindled the passions of their adversaries, and increased the virulence of the contest. The

comedians, who were pagans, took advantage of the occasion to ridicule the Christian religion in the theatres.

It now became impossible for the Emperor Constantine to remain neutral or indifferent, and in order, as he thought, to effect a final settlement of the question, he convoked the memorable Council of Nicæa, or Nice (see CREEDS), in Bithynia, 325. Three hundred and eighteen bishops from almost all parts of the Christian world, but especially from the East, were present, besides numbers of priests, deacons, and acolytes. Arius boldly expounded and defended his opinions. He declared in the most unambiguous manner that the Son of God was created out of nothing; that he had not always existed; that he was not immutable or impeccable; that it was through his free-will he remained good and holy; that if he had chosen, he could as easily have sinned as not; in a word, that he was a mere creature and work of the Deity. He further affirmed that the Son of God was not of the same substance with the Father; that he was not the 'Word' or 'Wisdom,' properly speaking; and that the Scriptures only attribute these names to him as they do to other created intelligences. These propositions were listened to with great calmness by the bishops, but the inferior clergy, or at least a majority of them, manifested the most violent opposition. Alexander, Bishop of Constantinople, was ably seconded by the young deacon, Athanasius (q.v.), the equal of Arius in eloquence, and in the power of his logic. It was principally by the reasonings of Athanasius that the Council was persuaded to define, in the most precise manner, the doctrine of the Godhead—viz. the absolute unity of the divine essence, and the absolute equality of the Father and the Son (see TRINITY). All the bishops subscribed it except two, who were banished, along with Arius, to Illyricum.

An imperial edict was now issued commanding the writings of the heresiarch to be burned, and threatening with capital punishment all who should be convicted of concealing them. But at Alexandria, the Arians continued in a state of open insurrection, and began to league themselves with other condemned sects. The great influence of Eusebius was also exerted on behalf of the exiled heretic, as well as that of Constantia, the sister of the emperor, who had herself embraced Arian tenets, and in 328 permission was granted to Arius to return from Illyricum. In 330 he had an interview with the emperor; and, in the confession of faith which he presented, he declared his belief that the Son was born of the Father before all ages, and that, as the 'Word,' he had made all things both in heaven and earth. The emperor was satisfied, and sent orders to Athanasius, now Bishop of Alexandria, to receive Arius into the communion of the church. This Athanasius refused to do, and a series of tumults was the consequence. Eusebius was greatly irritated. He called a synod of bishops at Tyre, in 335, which proceeded to depose Athanasius. The emperor was even prevailed on to remove him to Gaul. In the same year, another synod met at Jerusalem, which revoked the sentence of excommunication uttered against Arius and his friends. Still the majority of the Christians of Alexandria clung to the doctrines of Athanasius. Disappointed in his expectations, Arius, in 336, proceeded to Constantinople, where he presented the emperor with another apparently orthodox confession of faith; whereupon orders were issued to Alexander, Bishop of Constantinople, to administer to him the holy communion on the Sunday following. Before the ceremony, however, he died so suddenly that his disciples declared that he had been poisoned, while the orthodox devoutly affirmed that God had answered the prayers of Alexander.

The manners of Arius were graceful and modest; he was noted for even an ascetic abstinence, and the purity of his moral character was never challenged by a single enemy. He is said to have composed songs for sailors, millers, and travellers, in popular measures, for the purpose of spreading his peculiar tenets; but no traces of these survive.

After his death, his followers rallied round Eusebius, now Bishop of Constantinople (338), from whom they were styled Eusebians. Constans, who ruled the West after the death of Constantine (337), and Constantius in the East, made an essay towards reconciliation; but it failed at the synod of Sardica (343), where the occidental bishops gathered themselves round Athanasius in support of the *Homoousian* doctrine (identity or *sameness of substance*), while in a separate council at Philippopolis, the oriental bishops asserted the *Homoiousian* doctrine (implying merely *similarity of substance*). Slight as might appear the verbal difference between the two parties, the bitterness of the controversy was intense, and pervaded almost all departments of public and private life. Constantius having gained dominion over the West, the Arian cause, which he favoured, triumphed at the synod of Arelate or Arles (353) and at that of Milan (355). These victories, however, were more apparent than real. The Nicene doctrine had still strong support on its side, and was strictly maintained by the banished Athanasius and his friends, while the Antinicæans, soon after their triumph, were divided into at least three parties. The old Arians, also styled Anomœans, or Heterousians, asserted, in the boldest style, their doctrine of 'distinct substances.' The semi-Arians (a large majority in the Eastern Church) maintained the Homoiousian doctrine of similar substances. A third party held the same doctrine with some qualification. Morally, the victory was leaning to the side of the Nicæans. Julian the Apostate (361–3), in his hatred of the Christian religion, left all parties at liberty to contend as they pleased with one another, so that they did not interfere with his plans. Jovianus and his followers in the West, Valentinianus I., Gratianus, and Valentinianus II., extended full toleration to both parties. Arianism at last was virtually suppressed in the Roman empire, under Theodosius in the East (379–95), and Valentinianus II. in the West. Among the German nations, however, it continued to spread through missionary efforts. Bishop Ulfilas, the translator of the Bible into the Mœso-Gothic language, had been the means of converting the West Goths to Arian Christianity as early as 348; and they adhered to it until the synod of Toledo in 589. The East Goths, Vandals, Burgundians, the Suevi in Spain, and the Lombards also adopted Arianism; but with all the Nicene doctrine ultimately prevailed, the Lombards holding out until 662. Many of the mediæval heretics were charged with unsoundness on the Person of Christ; at and after the Reformation the main representative of anti-Trinitarian views was Socinus (q.v.), followed later by the Unitarians (q.v.). The two anti-Trinitarians burnt in England in 1611 were inaccurately called 'Arians.' John Milton (q.v.) was more nearly Arian; Sir Isaac Newton and Locke were probably unsound on the Trinity. Dr Samuel Clarke (q.v.) earnestly asserted opinions called semi-Arian; and Adam Clarke (q.v.) denied the 'Eternal Sonship.'

See Harnack's *History of Dogma*, Stanley's *Eastern Church* (1861), Gwatkin's *Arian Controversy* (1896); the articles CHRIST, SOCINUS, TRINITY, UNITARIANS.

Arizona, a south-western state of the United States of America in 31° 20′–37° N. lat., 109°–114° 45′ W. long., extending from Utah on the north to Mexico, and from New Mexico on the east to California and Nevada. Its western

boundary is mostly formed by the Colorado of the West, a large river remarkable for its great cañons. This river traverses the NW. part of Arizona in a deep and narrow water-worn channel (the Grand Cañon), more than 300 miles long, and nowhere less than a mile below the surface of the surrounding country. Arizona has an area of 113,810 sq. m., including 146 sq. m. of water. It is in general a region of high plateaus, traversed by various mountain-ranges, presenting abundant evidence of not remote volcanic action. In the SW. the country has a desert character, and in all parts the rainfall is decidedly limited in amount. In various parts there are extensive lava-beds. The whole region lies in the drainage basin of the Colorado, though many of the smaller streams do not under ordinary conditions pay any tribute to that river, their waters being all evaporated or absorbed, except in rainy seasons. The chief affluents to the Colorado are the Gila, the Bill Williams, and the Colorado Chiquito. The main Colorado is navigable for light-draught steamboats for 600 miles, but abounds in shifting sand-bars. The rainfall is scanty, the mean annual fall at Prescott being 16·1 inches, and the summer temperature is high. Irrigation is found necessary for any important development of agriculture. In some districts there are extensive remains of abandoned irrigation canals, where at present there is little water to be had. This indicates a larger water-supply in the past and the practice of irrigation by the ancient inhabitants. At present the basins of the Gila and the lower Colorado offer opportunities for extended irrigation, and the government is actively engaged in the construction of reservoirs. It is estimated that 10,000,000 acres may eventually be reclaimed. Greatest of these works is the huge Roosevelt dam across the Salt River Valley, 280 feet high, 1080 feet wide at top, forming a reservoir holding water enough to irrigate 210,000 acres of formerly arid soil. The Laguna dam on the Colorado River near Yuma is important, while irrigation is sometimes effected by artesian wells. As a result of these efforts, agriculture has made much progress in Arizona. Cotton, cereals (wheat, corn, barley), vegetables (potatoes, lettuce), and fruits (oranges, grape fruit, dates) are grown. Cattle and sheep are raised in large numbers, and ostrich farming is carried on. The vegetation of Arizona, though not luxuriant, comprises many trees and plants not found elsewhere in the United States. The animals are mainly those of the Rocky Mountain region. The avifauna is rich, many Mexican birds occurring here either as residents or as visiting species. The 'Gila monster' (*Heloderma suspectum*) is remarkable as constituting, with the Mexican *H. horridum*, the only genus of lizards known to be venomous; and the 'horned toad' (a lizard) is very common.

Arizona is very rich in metals and minerals, especially in copper, in which it stands first among the States, with an annual production of over 700 million pounds. Silver stands next in output, its annual yield being valued at over $5,000,000; gold follows with a value of over $4,000,000. The precious metals are generally obtained from regular lodes, since the defective water-supply makes 'placer' and hydraulic mining for the most part unprofitable. Coal has been obtained at various points. Rock-salt, lead, and other valuable mineral deposits are reported from almost every part of the country; but many of the most profitable mining enterprises are seated in the south-eastern districts. It has been observed that the richest mines of the precious metals are on a belt crossing the state from NW. to SE. The state is traversed from east to west by two great lines of railway, of which the Santa Fé Pacific crosses in the northern central region, and the Southern Pacific Railroad in the southern part of the country. The manufacturing interests of Arizona are for the most part connected with the mines. The crushing, milling, and amalgamation of ores form an important business. Ores rich in lead, and some others, are largely smelted.

The principal towns are Tucson, an old Mexican town (pop. in 1920, 20,292); Phœnix, the capital, a farming and mining centre (pop. in 1920, 29,053); Prescott, the former capital, in a gold and silver district; Jerome and Globe, in copper districts; and Tombstone, a silver-mining centre. There are normal schools at Tempe and Flagstaff, and the university of Arizona is near Tucson. Some of the old Indian towns, or pueblos, still cherish their peculiar ways; occasionally a whole community occupies a single large stone-built house several stories high.

This region was first visited by Spaniards in 1570, and their military post at Tucson was established in 1580. Considerable numbers of the Indians were Christianised and partly civilised by Spanish missionaries; but many of the half-civilised pueblo Indians have persistently refused to become Christians. The warlike Apaches and other wild native tribes for 300 years gave much trouble, and it was not till 1886 that the United States forces and the Mexican troops, acting conjointly in the frontier districts, gave the Apaches such a severe punishment, that their power to annoy the white settlers would appear to be for ever destroyed. Indian hostilities from the first greatly interfered with the development of the region. After 1821 the country was a part of Mexico until 1848, when it passed to the United States, which in 1853 effected further the 'Gadsden Purchase' (see GADSDEN). The territory was organised in 1863; a scheme for uniting it and New Mexico as the state of Arizona was defeated in the Senate (1906), but it was admitted to the Union as a separate state in 1912. Pop. (1870) 9658, and tribal Indians; (1900) 122,931; (1920) 334,162, including 32,989 Indians, and 60,325 foreign-born Mexicans.

Ark. See DELUGE.

Ark of the Covenant, ARK OF THE TESTIMONY, or ARK OF JEHOVAH, is mentioned no less than 200 times in the Old Testament, and has at least twenty-two different designations. It was an oblong box of acacia-wood, overlaid with gold within and without, two cubits and a half (3 ft. 9 in.) in length, one cubit and a half (2 ft. 3 in.) in breadth and height, in which was deposited the 'testimony,' the law of the ten commandments inscribed on two stone tablets. (In Hebrews, ix. 4, mention is also made of the pot of manna and Aaron's rod.) The lid of the *mercy-seat* was of gold, and had at each end a *cherub*, between which was the place of the *Shechinah* or visible manifestation symbolical of the Divine presence. Rings were fastened to the ark, through which were inserted the staves by which it was carried, after being covered with a curtain of badgers' skins, with a blue cloth over all. Alike in the tabernacle and in the temple it was put into the 'most holy place,' into which, on the 'day of atonement,' the high-priest was to enter alone. The desire of the Israelites to have the ark in the army, and its solemn conveyance to the new capital in David's time, have been interpreted as revealing a somewhat sensuous conception of Jehovah as actually having his residence within it. This is but little in harmony with the spiritual idea of Jehovah found in the prophets, and it is significant that the ark is only once alluded to by them, and that in a very peculiar manner (Jer. iii. 16). The ark and the mercy-seat have long held an important place in

the orthodox interpretation of Old Testament typology.

Professor Sayce pointed out a close parallel in the Babylonian *papakhu* borne on men's shoulders in procession at festivals. These 'arks' filled an important place in the Babylonian ritual. They had all special names, and were the visible abodes of the gods to which they belonged. Parallels have also been found in Egypt, where, as Cheyne says, 'no festal processions could be sculptured or painted without them. The arks with their images were placed on boats which were ornamented at the ends with heads of the divinities within.' Ark-shrines are also characteristic of the Japanese religions.

See appendix in A. R. S. Kennedy's Century Bible edition of 1 and 2 Samuel.

Arkan'sas, formerly pronounced *Ar'kansaw* and popularly known as 'the Bear State,' is one of the states of the American Union, and is bounded N. by Missouri, E. by Missouri, Tennessee, and Mississippi, S. by Louisiana, and W. by Texas and Oklahoma. Area 53,335 sq. m.—rather under that of England without Wales—of which 810 sq. m. is water-surface. The southern limit is the parallel of 33° N. lat., and the northern boundary for the most part is on the parallel of 36° 30′. The Mississippi River washes nearly all the eastern border of the state. The extreme east and west limits are respectively 89° 40′ and 94° 42′ W. long. Nearly all the country is well timbered. Along the eastern border of the state, for more than half its extent from the north, lies a strip of rich alluvial and swampy land, 60 miles in average breadth, and limited westward by Crowley's Ridge, a prominent feature of the country. A similar low and wet tract is traversed by the lower Arkansas River. The southern half of the state contains great areas of yellow and loamy land of Tertiary age, interspersed thinly with tracts of red clays and hills of iron-ore. West of the Crowley's Ridge region is a considerable breadth of gray silty prairies. In the west of the yellow Tertiary loams are large patches of 'black prairie' of Cretaceous age. The west and central portions of the state form a broken hill-region of Tertiary origin. Great prairies of red loam and clay soil prevail in the W. and NW. Towards the north is the Ozark mountain-region, a broken country of high hills and ridges. The soils, though of extremely various character, are mostly good throughout the state. The coal-measures very extensively underlie the surface, and coal of excellent quality crops out at many points. The output of petroleum is large, and manganese ores and lead are produced. Diamonds have been found, and natural gas occurs in considerable quantities. The villages of Hot Springs in Garland county, and Eureka Springs in the NW. are celebrated health-resorts. The novaculite, or hone-stone, of this state is extensively wrought and exported. The Mississippi, Arkansas, Red, White, St Francis, Ouachita, and other navigable rivers afford excellent facilities for the cheap transportation of goods. In the north-eastern alluvial region occur several large but shallow lakes, which were formed during the great earthquakes of 1811.

Agriculture is the leading pursuit in Arkansas, and cotton is the great staple of production. Maize and wheat are also very largely produced, and considerable quantities of oats and rice. Livestock, wool, tobacco, and dairy products are marketed. Much attention is also given to fruit culture, and the state is famous for apples and peaches. The river valleys are exceptionally fertile. Roses are cultivated for perfumery.

The development of the railway system of the state has given far greater variety and enterprise to the agriculture of Arkansas than it had under the old system of slave labour, when cotton, maize, and pork were almost the sole articles of production. Arkansas is still one of the leading states in cotton production, and it has been asserted that if the cotton-lands were worked to anything near their full capacity this state might furnish as much of this staple as is now raised in the whole United States. There are still large areas of undeveloped government land. Stock-raising of all kinds is important. Although malarial fevers and severe heat are to be encountered in the marshy and flat alluvial districts, the larger portion of the country has an agreeable and healthful climate, and few parts of the republic offer greater natural attractions to the immigrant. At Washington, in the NW. of the state, the mean annual temperature is over 61°, and the annual rainfall 54·5 inches; at Fort Smith, in the W., the rainfall is 40·36 inches. The extensive forests of Arkansas have become a source of wealth. Hard woods prevail north of the Arkansas River, cypress swamps cover a great part of the eastern alluvial districts, and in the south there are extensive areas covered with pine. In quality, variety, and accessibility, the timber of this state is hardly surpassed. Great attention has been given to the black walnut timber of Arkansas, which is extensively used by cabinetmakers. Shingles, staves, and rough lumber are largely shipped. The manufacturing interests of this state (apart from the sawing of lumber, and the like, milling, smelting) are for the most part little developed. Valuable water-power exists in the hilly and mountainous districts, but it is thus far not extensively utilised. Mills for the extraction of cotton-seed oil find profitable employment. The mineral resources of the state are believed to be very large, but they have been but little utilised. Lying outside the great currents of immigration, Arkansas, until very recent years, preserved to a remarkable degree the character of a frontier country. Even the large extent of river navigation for a long time served to hinder the development of the country, since it discouraged the construction of railways, and as a consequence, great tracts of excellent land lying at a distance from the large streams are even now very thinly peopled. The old system of slave labour and of large holdings of land was not favourable to rapid material development. This region formed a part of the French colony of Louisiana, and was purchased, together with the rest of that colony, by the United States in 1803. The earliest French settlement was made at Arkansas Post in 1685. Arkansas was organised as a territory in 1819, and became a state in 1836. An ordinance of secession was passed by a state convention in 1861, and during the war which followed, this state was the scene of several active campaigns.

The state university is situated at Fayetteville, and there are various religious colleges. There are separate schools for white and black children. Since 1880 there has been a great movement of coloured immigrants from the older states. The light yet fertile soil, and the warm climate of southern Arkansas, seem specially attractive to this class of settlers, and the movement has been greatly encouraged by the planters of that section. The white population is almost entirely composed of English-speaking people of American birth.

The principal cities are Little Rock (the state capital), Fort Smith, Pine Bluff, North Little Rock (formerly called Argenta), Hot Springs. Population of Arkansas (1820) 14,255; (1850) 209,897; (1860) 435,450; (1880) 802,525; (1891) 1,128,179; (1900) 1,311,564; (1910) 1,574,449; (1920) 1,752,204, of whom 472,220 were negroes.

Arkansas City, a manufacturing town of

Kansas, on the Arkansas River, 48 miles SSE. of Wichita. Pop. (1925) 14,003.

Arkansas River, next to the Missouri the largest affluent of the Mississippi. It is 1514 miles long, rising in the Rocky Mountains, at an altitude of 10,000 feet, on the borders of Utah, and joining the 'Father of Waters' at Napoleon, 275 miles above New Orleans. Flowing generally through a level country, it presents but few obstacles to navigation. The principal difficulty is connected with its periodical rise and fall—the difference between season and season being not less than 25 feet. It varies in width from 150 feet near the mountains, to about a mile in the sandy regions, and is practicable for steamboats, during nine months of the year, to a distance of 800 miles from its mouth. It divides the state which takes its name into nearly equal parts. Its most important tributary is the Canadian River.

Arklow, a seaport of Wicklow, 49 miles S. of Dublin, at the mouth of the lovely Avoca, which is crossed here by a bridge of nineteen arches. Near it is Shelton Abbey, the seat of the Earl of Wicklow. There are ruins of the castle of the Ormonds, destroyed by Cromwell in 1649, and traces of an ancient monastery. In 1798, a bloody encounter took place here between the government troops and the United Irishmen. Arklow (pop. in 1926, 4526) is the chief fishery port in Ireland.

Arko'na, the NE. promontory of the island of Rügen, in the Baltic. Its chalk-cliffs rise to a height of 177 feet, topped with a lighthouse, built in 1827, itself 78 feet high, from which the Danish island of Möen, 33 miles NW., can be seen. Here stood the famous fortification (Slav. *Urkan*) so long impregnable, and the temple of the Wend deity Swantewit, the most sacred sanctuary of the Slavs of Northern Germany. It was destroyed, after a long struggle, by King Waldemar I. of Denmark in 1168. The remains of the *burg-ring* or wall still stand on the land side of the promontory.

Ark'wright, Sir Richard, celebrated for his inventions in cotton-spinning, was born at Preston, in Lancashire, December 23, 1732. Of humble origin, the youngest of thirteen children, he was bred to the trade of a barber, and his early opportunities of cultivation were exceedingly limited. About 1750 he settled as a barber in Bolton, and for several years became also a dealer in hair. A secret process for dyeing hair, said to have been discovered by himself, increased considerably the profits of his trade. Very little is known regarding the first movements of his mind in the direction of mechanical invention. His residence in the midst of a cotton-spinning population naturally led him to take an interest in the processes used in that manufacture. Having no practical skill in mechanics, he secured the services of a watchmaker, named Kay, to assist him in the construction of his apparatus. About 1767 he seems to have given himself wholly up to inventions in cotton-spinning. In the following year he removed to Preston, where he set up his first machine, the celebrated *spinning-frame*, consisting chiefly of two pairs of rollers, the first pair moving slowly in contact, and passing the cotton to the other pair, which revolved with such increased velocity as to draw out the thread to the required degree of fineness. No previously invented machinery had been able to produce cotton-thread of sufficient tenuity and strength to be used as warp. An invention, indeed, by Mr Charles Wyatt of Birmingham, which was patented in 1738, but never succeeded, deprives Arkwright of the honour of having been the first to use rollers in spinning; but there is no reason to believe that he owed anything to this previous attempt. The first suggestion of the idea, he said, was derived from seeing a red-hot iron bar elongated by being made to pass between rollers. At this time Arkwright was so poor that he needed to be furnished with a suit of clothes before he could appear to vote at an election as a burgess of Preston. Soon after, he removed to Nottingham, to escape the popular rage, which had already driven Hargreaves, the inventor of the *spinning-jenny*, out of Lancashire. Here he fortunately fell in with Mr Jedidiah Strutt of Derby, the celebrated improver of the *stocking-frame*, who, in conjunction with his partner Mr Need, entered into partnership with Arkwright.

In 1769 Arkwright set up his first mill, driven by horses, and took out a patent for his invention. In 1771 he set up a larger factory, with water-power, at Cromford, in Derbyshire. In organising his business, Arkwright showed remarkable energy and capacity; and he may be regarded as the founder of the factory system. In 1775 he took out a fresh patent for various additional improvements in machinery. The success attending these undertakings stimulated rivals to invade his patent; and to such an extent did other cotton-spinners use his designs, that he was obliged, in 1781, to prosecute at once nine different manufacturers. The first action, against Colonel Mordaunt backed by a strong combination of Lancashire manufacturers, was lost, solely on the ground that his description in his specification was not sufficiently clear and distinct. The other actions were abandoned; and, in the following year, Arkwright published a pamphlet containing a statement of his case. In a new trial in 1785, he obtained a favourable verdict. The whole question, however, was brought finally before the Court of Queen's Bench, a few months after, when Arkwright's claim to the inventions patented was for the first time called into dispute. On the doubtful evidence of a person named Highs, or Hayes, combined with that of Arkwright's old assistant Kay, the jury decided against him, and his patent was annulled. This was but the formal outcome of an opposition which had from the beginning marked out Arkwright as an object of hostility. The manufacturers at first combined to discountenance the use of his yarn. When the yarn was made into calicoes, and parliament was petitioned to lessen the duty on that cloth, they strenuously opposed the measure, but in vain. Popular animosity was also excited against him on the ground that his mechanical improvements diminished the demand for labour; and on one occasion, a large factory belonging to Arkwright was destroyed in the presence of a powerful military and police force, without a word of interference from the magistrates. Arkwright, however, triumphed over all opposition. In 1790 he introduced the steam-engine into his works at Nottingham; and at the time of his death in 1792, the value of his property amounted to about half a million sterling. In 1786, on the occasion of presenting an address to the king, congratulating him on his escape from the knife of the maniac Margaret Nicholson, he was knighted. In 1787 he was appointed high-sheriff of Derbyshire. A severe asthma had pressed upon him from his youth; and a complication of disorders, the result of his busy sedentary life, terminated a remarkable career at the comparatively early age of sixty, on the 3d of August 1792.

Arlberg is the name of a crystalline mountain mass amongst the Eastern Alps, which forms the boundary between the Austrian lands of Tirol and Vorarlberg ('the land before or beyond the Arlberg'). The pass over this ridge, that on the route from Bludenz to Landeck and Innsbruck, is 5300 feet high, and is one of the most difficult in the Tirolese Alps, though it is practically the

only one between the two Austrian lands. The scheme for a railway with a tunnel through the Arlberg Alp took definite shape in 1880, and the railway from Innsbruck to Bludenz was opened 15th November 1884. The railway is through a singularly beautiful mountain country, and is much frequented by tourists to and from Italy. The main tunnel is 6720 yards in length, and cost £1,500,000.

Arles, one of the oldest towns in France, in the department of Bouches-du-Rhône, situated on the left bank of the principal branch of the Rhone, 15 miles from the sea and 53 miles NW. of Marseilles by rail. It is famous for its Roman remains, including baths, a palace of Constantine, an aqueduct, a huge amphitheatre (447 feet by 341 feet) capable of accommodating 25,000 spectators, and a theatre, where a fine statue of Venus was unearthed. The early Christian cemetery of Aliscamps or Alyscans contains sarcophagi. The beautiful Romanesque cathedral of St Trophime has a fine portal and cloisters, the museum has many Christian antiquities. Mistral founded a Provençal museum here. Arlesian women, who wear a picturesque costume of their own, are famed for their classical beauty. Canals connect Arles with the harbour of Bouc and with Marseilles. Arelate or Arelas under the Romans was the seat of a prefect; afterwards, for some time, the residence of the Gothic king, Eurich; and in 879 the metropolis of the kingdom of Arelate (see BURGUNDY). It was a free city in the 12th century. In the early Christian times several important synods were convened here (314, 354, 452, 475 A.D.). Pop. (1926) 29,146.

Arles, a term used in Scotland and the north of England for a piece of earnest-money given in confirmation of a bargain or engagement, especially when a servant is hired. The ultimate origin of the word is the Latin *arrha*, 'earnest-money,' 'part of the price paid down.'

Arlington, HENRY BENNET, EARL OF, was born at Arlington, Middlesex, in 1618, and from Westminster School proceeded to Christ Church, Oxford. During the civil war, at Andover he got a lifelong scar on the nose; afterwards at Madrid, as Charles's agent, he acquired an equally lasting pomposity. The Restoration brought him back to England. Created Lord Arlington in 1663, and Earl of Arlington in 1672, he was not the most scrupulous member of the unscrupulous Cabal (q.v.). In 1674 he was impeached as a promoter of popery, a self-aggrandiser, and a betrayer of trust—in brief, as the 'conduit-pipe' of Charles's evil policy. The impeachment fell through; but Arlington exchanged the office of secretary of state for that of lord chamberlain, and finally retired to his Suffolk seat, Euston, where he died, 28th July 1685. See Study by Barbour (1914).

Arlon (anc. *Orolanum*), a town of Belgium, the capital of the province of Luxemburg, 27 miles WNW. of Luxemburg by rail. It is a neat and prosperous town, and has a considerable trade in corn, iron-wares, tobacco, crockery, and clay-pipes. The town is mentioned as early as 870; the nunnery of Clairefontaine, in the neighbourhood, is now a foundry. Pop. 11,000.

Arm. The upper extremity of the human body may be divided into three portions—viz. the shoulder, the hand, and the intermediate shaft or arm. The latter consists of an upper arm and a forearm. In the upper arm there is one bone, the humerus, *h* (fig. 1). This bone presents a globular *head*, which articulates with and moves freely upon the scapula, *s*, forming the shoulder-joint. At the junction of the head and shaft of the humerus, there is a constriction termed the anatomical neck. The shaft is cylindrical in its upper part, but becomes flattened and somewhat three-sided below. A short distance above its lower end, and on the inner side, a hooked process pointing downwards is very occasionally found. This represents a process of bone forming a complete foramen in carnivorous animals, through which the main artery and nerve of the limb run. At the lower end of the shaft two articular surfaces for the bones of the forearm are found; the outer, rounded for the head of the radius, *r*; the inner, a pulley or trochlea for

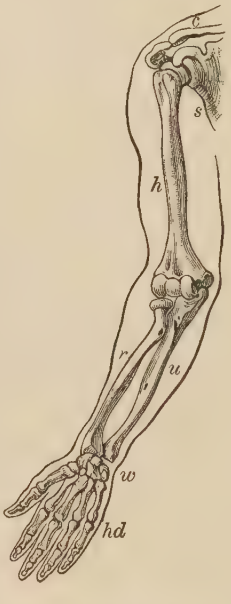


Fig. 1.—Bones of the Human Arm:

h, humerus; *r*, radius; *u*, ulna; *w*, wrist-joint; *hd*, hand; *s*, scapula; *c*, clavicle, or collar bone.

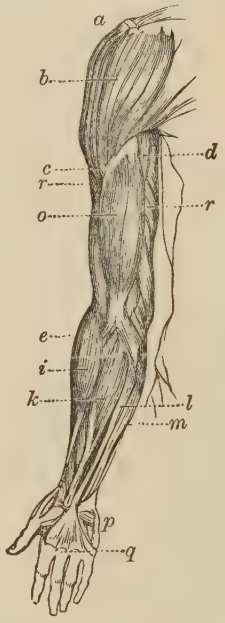


Fig. 2.—Muscles of the Human Arm:

abc, deltoid muscle; *d*, coracobrachialis muscle; *r*, *r*, triceps; *e*, *i*, extensors of wrist and long supinator of the hand; *km*, flexor of fingers and radial and ulnar sides of the wrist, and *l*, palm of the hand, or palmaris longus; *p*, palmaris brevis; *q*, palmar fascia; *o*, biceps.

the movements of the ulna, *u*. The bones of the forearm are two in number, the radius and ulna; the former being placed upon the outer, the latter upon the inner aspect of the forearm. By their upper ends, these bones articulate with the humerus, to form the elbow-joint; by their lower ends, with the carpus, to form the wrist-joint, *w*.

The shoulder-joint is constructed upon the plan of a ball and socket, the bones being held in position by a capsular ligament which is very loose, thereby allowing freedom of movement to a greater extent than in any other joint in the body. This gain in mobility occasions a loss of stability; hence dislocations are frequent. For the most part, the head of the humerus is driven downwards into the armpit, this being the only side of the joint unsupported by muscles passing to be *inserted* into the upper end of the shaft. See SHOULDER.

A large triangular muscle, the *deltoid*, raises the arm from the side—a movement distinctively human; it is depressed by the *coraco brachialis*, the *latissimus dorsi* (the great muscle of the back), and the *pectoralis major* (the great muscle of the chest); in addition, it can be carried forwards and backwards by the action of these muscles.

Circumduction is the result of a combination of these movements.

The elbow-joint is hinge-like or ginglymoid. It is provided with strong lateral ligaments, and its movements are extension or straightening of the forearm produced by the *triceps;* flexion or bending by the *biceps*, *brachialis anticus*, and *supinator longus*. During the latter movement, the twist upon the trochlear surface at the lower end of the humerus causes the hand to be carried inwards in the direction of the mouth.

Joints called radio-ulnar are found between the bones of the forearm at their upper and lower extremities. The movements at these joints affect the hand, for it articulates with the lower end of the radius to which they are principally due. When the radius rolls forward upon the ulna, the palm of the hand is turned downwards—*pronation;* when it rolls backwards, the palm is turned upwards —*supination*. Each movement is produced by two muscles, which take their fixed points from the humerus and ulna.

A variety of the hinge-joint is found between the radius and carpus, for, in addition to flexion and extension, the hand can be drawn to the radial or ulnar borders of the forearm. These movements are effected by the *palmaris longus*, the flexors and extensors of the radial and ulnar sides of the wrist.

The upper extremity is supplied with blood by the continuation of the axillary trunk, the brachial artery, and its branches. The veins collect into large superficial trunks, which unite at the bend of the elbow, at which situation one is frequently selected for venesection, and then pass on to join the axillary, on the outer side by the cephalic vein, on the inner side by the basilic. The axillary vein is formed by the junction of superficial vessels just mentioned with the deeper companion veins which accompany each branch of the brachial artery.

The nerves pass down as large cords by the side of the artery, and diverge from it to their ultimate distributions; the musculo-spiral soon passing round the back of the upper arm to appear on the outer side, and become the radial and posterior interosseous nerves; the ulnar running behind the internal condyle of the humerus, for which it has obtained the term 'funny bone,' from the electric-like thrill which passes along the arm when the nerve is struck or pressed. The median, as its name implies, keeps a middle course with the artery. See NERVOUS SYSTEM.

The arm affords excellent illustrations of some of the principles of mechanics. The insertion of the muscles so near, as will be seen, to the fulcra or centres of motion, involves a loss of power in the usual sense of the word; there is, however, a corresponding gain in velocity at the end of the lever; and for most of the purposes to which the hand is put, agility is of far greater moment than dead strength. See LEVER.

As far back as 1795, attention was first directed by White to the proportion between arm and forearm. Subsequent measurements have shown that a long humerus, and a still longer radius, are essentially ape-like characters, while the very reverse is typical of man, in whom the radius is shorter than the humerus. In anthropoid apes, the arm, from shoulder to wrist, is therefore longer than in man.

Extending the investigation to the different races of mankind, we find that there is very little divergence, except in the case of the African negro and Australian aboriginal, in whom the forearm is longer than in the white races. Notwithstanding this approximation to the anthropoid type, the arm of the negro, from shoulder to wrist, is a little shorter than that of the European. The explanation of this anomaly is found in the fact that the humerus of the negro is shorter than that of the European, and thus two inferior characters—a short humerus and a long radius—have combined to produce a superior one—a short arm. This affords an illustration of the fact that the proportions between human and anthropoid skeletons may approximate at one point while they diverge at another, even in the same type.

Arma'da, a Spanish word signifying simply an armed force, but applied specially to the great Spanish fleet fitted out against England in 1588. The king of Spain, Philip II., had resolved to strike a decisive blow at Protestantism by conquering England, which Pope Sixtus V. had formally made over to him. The ports of Spain, Portugal, and other maritime dominions belonging to him, had long resounded with the noise of his preparations, and the most eminent Catholic soldiers from all parts of Europe flocked to take a share in the expedition. The Marquis of Santa-Cruz, an admiral of reputation and experience, received the command of the fleet, and the famous Duke of Parma of the land-forces. The latter had already gathered 30,000 men in Flanders, and merely waited the arrival of the armada to protect his crossing. As no doubt was entertained of success, the fleet was ostentatiously styled the Invincible Armada. When ready for sea, it consisted of 129 vessels, 65 of which were over 700 tons, and was manned by 8000 sailors, while it carried 19,000 Castilian and Portuguese soldiers, over 2000 cannon, and provisions sufficient to feed 40,000 men for six months. A squadron of 80 ships, only 30 of which were ships of the line, was all that Elizabeth had to oppose it by sea; but although the English fleet was much inferior in number and size of shipping to that of the enemy, it was much more manageable, while it was manned by 9000 of the hardiest seamen in Europe. Lord Howard of Effingham (q.v., usually but doubtfully said to have been a Catholic) took upon him as lord high admiral the command of the fleet; Drake, Hawkins, and Frobisher served under him; while a few ships, under Lord Seymour, lay off Dunkirk, to watch the Duke of Parma. Such was the preparation made by the English; while all the Protestants of Europe regarded this enterprise as the critical event which was to decide for ever the fate of their religion. Drake's daring attack on the store-ships in the harbour of Cadiz had already delayed the expedition, and it was further delayed at the moment of sailing by the death of the admiral Santa-Cruz. Scarcely had it actually sailed under command of the Duke of Medina Sidonia, a seaman of but little experience, when a gale in the Bay of Biscay drove it for shelter into Ferrol. Some time was lost in refitting, and it was not till the end of July that the sails of the fleet were seen from Lizard Point, and the English beacons had flared their alarm all along the coast. The armada was disposed in the form of a half-moon, stretching seven miles from the one horn to the other. The Spanish admiral, instead of going to the coast of Flanders to take in the troops stationed there, resolved to sail directly to Plymouth, and destroy the shipping in the harbour. But Howard slipped out of Plymouth Sound, and hung with the wind upon his rear. He refused to come to close quarters, but attacked the Spaniards at a distance, pouring in his broadsides with admirable dexterity, and escaping at will in his swift and easily handled vessels out of the range of the Spanish shot. Galleon after galleon was sunk, boarded, or driven on shore, and 'the feathers of the Spaniard were plucked one by one.' As the armada advanced up the Channel, the English still followed and harassed its rear, and the running fire continued throughout the week, until the Spaniards took shelter in the

port of Calais. At midnight Howard sent eight of his smaller vessels, filled like fireships with combustible materials, and ablaze, into the midst of the enemy. The Spaniards in panic cut their cables and stood out to sea, while the English ships pursued closely, and came up with them at dawn off Gravelines. Broadside after broadside the English poured into the towering ships of the armada, which in their turn were unable to do any great damage to them. At the close of six hours' furious fighting they found their best ships shattered to pieces and drifting with a north-west wind upon the sandbanks of Holland. More than 4000 men had fallen, while on the English side not a hundred men had been killed, and not a ship had been taken. The Spanish admiral in despair called a hasty council of war, in which it was resolved that, as their ammunition had begun to fail, as their fleet had received great damage, and as the Duke of Parma had refused to venture his army under their protection, they should return to Spain by sailing round the Orkneys, the winds being contrary to their passage directly back. The English ships were soon compelled to fall back from want of ammunition, with which they had been but stingily supplied through the ill-timed cheese-paring policy of the queen; but the storms of the northern seas broke upon the armada, and finished the work of destruction. When Howard fell back from the pursuit, on the 13th of August, there were still 100 vessels in the Spanish fleet; fifty-four only, and these in miserable condition, their crews dying of sickness and exhaustion, ever reached the ports of Spain. The rocks of the Hebrides and the western coast of Ireland were not more fatal to the ships than the hungry Islemen and Irish to their hapless crews. The seamen, as well as the soldiers who survived, were so overcome with hardships and fatigue, and so dispirited by their discomfiture, that they filled all Spain with accounts of the desperate valour of the English, and of the tempestuous violence of that ocean by which they were surrounded.

The story has been told by Froude in his History and in *The Spanish Story of the Armada* (1892), by Kingsley in *Westward Ho!* by Sir J. K. Laughton in *The Defeat of the Spanish Armada* (1894), and by J. R. Hale in *The Great Armada* (1913). Macaulay's spirited ballad is well known.

Armadillo (*Dasypus*), a genus of mammals in the order Edentata (q.v.). They are not, however, toothless, as the word Edentate would suggest, but provided with a variable number of simple molars, destitute of true roots, and distant from one another, so that those of upper and lower jaw interlock when the mouth is shut. Only in one case are there teeth which are not molars. The elongated snout bears at its tip the downward directed nostrils. The tongue is smooth, slender, and glutinous, but not long and extensile like that of the ant-eaters. The eyes are small and weak, probably in association with the burrowing habits of the animals, but the senses of smell and hearing are acute. The limbs are short and strong, and bear powerful claws, much used in burrowing. This they do very rapidly when in danger, while some, such as *D. apar*, protect themselves by rolling up into a ball and exposing only the armoured dorsal surface. This bony armour is indeed their most striking peculiarity, which distinguishes the genus from all other mammals except the allied Chlamydophorus. It consists of shields on head, neck, shoulders, and rump, and of movable cross bands of plates across the back. Even the tail may be thus armoured. In this way some of the armadillos have retained their foothold in the struggle with higher animals. Naturally timid and passive, they can, if forced, use their powerful claws in self-defence. They are nocturnal in habit, and feed on insects, worms, fruits, roots, and sometimes on carrion. They are distributed from Mexico and Texas southwards to Patagonia, and occur in immense numbers in the

Three-banded Armadillo (*Dasypus apar*).

woods and pampas. The largest of the numerous species (*D. gigas*) is fully 3 feet long, exclusive of the tail, which measures a foot and a half more, while the smallest is not above 10 inches in length. Though all are eaten, the flesh of the more vegetarian species is particularly esteemed. Nearly allied is the small hairy Chlamydophorus, which has no shields, but a loose leathery armour formed of 24 cross bands of plates. In the Pleistocene strata of South America, the armadillos are represented by giant fossil forms. See GLYPTODON.

Armadillo. See WOOD-LICE.

Armageddon, the great battlefield of the Apocalypse, in which the final struggle between the powers of good and evil is to be fought. Its name was undoubtedly suggested by that famous battlefield, Megiddo (Judges, v. 19), in the plain of Esdraelon, on which some of the most important battles in the history of Israel were fought, as the victories of Barak over the Canaanites, and Midian over the Gibeonites, as well as the defeat of Saul by the Philistines, and of Josiah by the Egyptians.

Armagh', the capital of County Armagh, 33 miles SW. of Belfast, is situated around and on a gentle eminence, whence its original name, Ard-Magha, 'the high field.' It is well built of limestone. The cruciform cathedral (184 by 119 feet), dating from the 12th century, is built of red sandstone, and is supposed to occupy the site of that erected by St Patrick in the 5th century. A Gothic Roman Catholic cathedral occupies the principal height to the north, and the primate's palace that to the south. There are a college, a celebrated observatory, a county courthouse, prison, public library (founded in 1771), fever hospital, district lunatic asylum, infirmary, and barracks. It is the seat of the archiepiscopal see of the Primate and Metropolitan of all Ireland. Armagh or Emain Macha was from 495 to the 9th century the ecclesiastical metropolis of Ireland, though it is doubted whether St Patrick founded it, and it was renowned as a school of theology and literature. Yet it was repeatedly sacked and plundered in native wars (as by Fedlimidh, king and bishop of Cashel in the 8th century) even before the Danish invasions. After the Reformation, it suffered severely in the conflicts between the English and Irish; it contained only three slated houses in 1765. Under the Redistribution of Seats Act (1885), Armagh ceased to be a parliamentary borough. Pop. (1881) 10,070; (1901) 7570; (1911) 7356; (1926) 7401.

Armagh, a small inland county in Ulster, Ireland; bounded N. by Lough Neagh, E. by Down, S. by Louth, W. by Monaghan and Tyrone. Its greatest length is 32 miles, and breadth 20. Area, 489 sq. m.; about one-half is under tillage, and the remainder in pasture, plantations, and bog, hill, and under water. The surface is hilly in the SW., and undulating in the centre, attaining in Slieve Gullion, in the SW., the height of 1893 feet. The country bordering upon Lough Neagh is low and boggy, and the Louth plain extends into the south end of Armagh. The principal rivers, navigable in their lower parts, are the Callan, the Tynan, the Upper Bann, flowing out of Down NW. for 11 miles before it enters Lough Neagh, and the Blackwater, which in its lower part separates Armagh from Monaghan. The rocks of Armagh are—Lower Silurian in the south and middle of the county; the trap of Antrim, with the underlying greensand, around Portadown; carboniferous limestone in the basins of the Blackwater and Callan; granite in the mountains of the SE.; and Tertiary strata bordering Lough Neagh. The soil is fertile, with a good deal of bog. The chief crops are oats, potatoes, wheat, turnips, and flax. The north and central parts of Armagh exhibit a dense population, low hills cultivated to the tops, hedgerows, orchards, and thickly scattered farmsteadings. Besides agriculture, linen and cotton weaving are the chief industries. Apples are largely grown. The county is mostly in the diocese of Armagh. It returns three members of parliament. The chief towns are Armagh, Lurgan, and Portadown. Pop. (1841) 233,024; (1871) 179,260; (1881) 163,177; (1911) 120,291, 45 per cent. Roman Catholics, 32 per cent. Episcopalians, the remainder chiefly Presbyterians; (1926) 110,083.

Armagnac, the old name of a district in the south of France, a part of Gascony now mostly included in the department of Gers. The soil is fertile, and its wine and brandy (*Eau d'Armagnac*) are well known. The inhabitants are noted for their simplicity, strength, and bravery; but are credulous and ignorant. The name *Armagnacs* was borne by a band of soldiers who did good service in the early history of France against the English and Swiss. The family of the Counts of Armagnac, which ended in 1497, played an important part in French history.

Armato'les, the warlike inhabitants, since the 15th century, of the mountain districts in Northern Greece, especially in Macedonia, Epirus, and Thessaly. At one time, as robbers, they ravaged the neighbouring country, at another time protected its wretched inhabitants from other robbers in consideration of black-mail. The Turkish pashas, unable to subdue them, made terms with them, and tried to metamorphose them into a sort of military police, intrusting to their care the safety of the public roads, and dividing the country into districts, each under the supervision of a chief of these militia. But although the Armatoles frequently suppressed the brigandage of the Klephts, they still regarded them as brothers of common origin and faith, and shared with them their hatred for the Turkish yoke, however nominal it might be. The Turks at last alarmed at this sympathy, tried to substitute for the Armatoles the Mohammedan Albanians, who were the implacable enemies of the Greeks. The moment the Greek insurrection broke out, in 1820, the Armatoles joined the insurgents 12,000 strong, and they at least gained some glory in the war.

Ar'mature is the term applied to the pieces of soft iron that are placed at the extremities or poles of magnets to preserve their magnetic power. See MAGNETISM; also DYNAMO-ELECTRIC MACHINES.

Armenia, a high tableland in the upper valleys of the Euphrates, Tigris, Aras, and Kur, 400 to 500 miles long, by nearly the same in breadth. In ancient times an independent country, it repeatedly recovered its independence down to the middle ages, although with varying boundary, as did a small part of it again in 1918. That part, the north-east, is included in the Russian confederation; the south-west belongs to Turkey; the south-east to Persia. The republic has an area of some 11,680 square miles; but at widest Armenia extends to the Caspian and the Caucasus (140,000 square miles). Extreme Armenian claims include Cilicia. The interior consists mostly of pastoral plateaus, 2700 to 7000 feet above sea-level, crowned by conical heights or traversed by mountain-chains. Beside Mount Ararat the three states meet. A chain of mountains, stretching from Ararat to the confluence of the two head-waters of the Euphrates, divides Armenia into a northern part, containing the plateaus of Bayazid, Erzerum, Kars, and Erivan; and a southern, in which lies the plain of Murad Su, 4650 feet high at Mush. On the plateau of Erivan, the principal cones are Little Ararat, 12,840 feet high; Great Ararat, 17,000 feet; and Ala Göz (with three pinnacles), 13,436 feet. Lake Van in Turkish Armenia is surrounded by mountains—Ala Dagh, Sipan Dagh (13,720 feet). The Kara Bagh plateau (in Persia) reaches 11,000 feet. The mountain-system of Armenia is mostly volcanic, in which trachyte and augite porphyry are mainly represented. The numerous cones are for the most part old craters. The volcanic nature of Armenia is still testified by its hot mineral springs, and by its earthquakes, which in 1840 destroyed a village on Ararat, in 1859 the town of Erzerum, in 1926 Leninakhan (Alexandropol). The Murad Su or East, and the Kara Su or West, Euphrates form the head-waters of the Euphrates; whilst head-waters of the Tigris flow from the confines of Armenia and Kurdistan. Other rivers are the Aras or Araxes, the Kur, and the Tchorak. Of lakes, there are Van in Turkish, Gökcha or Sevan in Russian, and Urmia in Persian Armenia. Armenia is rich in metals, possessing mines of silver, lead, iron, arsenic, alum, rock-salt, and especially copper.

The geographical area is divided into a subtropical region of rains, embracing the valley of the Upper Tigris; a region of perpetual snow, which, in Ararat, except on the NW. side, starts as high as 14,000 feet, but elsewhere descends some 3000 feet lower; and an intermediate region of very various grades, including the plateau of the frontier mountains and the plateau chains, to a height of 12,000 to 13,000 feet. This third zone ranges from a South-European to a Mid-European climate, with harvest as late sometimes as August and September. The plateaus—volcanic, dry, and singularly bare of wood—have a very severe climate; the winters long and inclement; the summers short, very hot during the day, but always cold at night. The cold north winds, against which Armenia has no protection, encountering the east and south winds, give rise to the storms that render the navigation of the Black Sea coast so dangerous. Much the richest belt of vegetation is the broad valley of the Aras; but the marshes produced by the many irrigating channels make this the most unhealthy part of Armenia. There are, nevertheless, rich vineyards and orchards, fields of cotton, tobacco, rice, hemp, and flax. The high tablelands are chiefly pastoral, though a little corn is also cultivated.

The ancients distinguished *Armenia Major*, the larger and eastern half, bordering on Media and the Caspian Sea, on Mesopotamia and Assyria, from *Armenia Minor*, to the west of the Euphrates. Turkish Armenia comprises parts of the districts of Trebizond, Erzerum, Bitlis, and Van, with the

cessions from Russia mentioned below. Russian Armenia, earlier Persian and Turkish, included the governments of Erivan and Kars, as also part of the government of Elizabetpol. The small part left, the Soviet Republic of Armenia (or Erivan, Hayastan) is but the middle section of the Aras valley with the mountains around Lake Gökcha to the north. It is essentially agricultural, and grows cereals and cotton by help of irrigation. Pop. 870,000, about 90 per cent. Armenians. The capital is Erivan (62,000). Nakhitchevan has been made dependent upon the Azerbaijan republic. Persia holds the province of Azerbaijan (adjacent to the republic of the same name). See AZERBAIJAN (second article).

The Armenian is rather above middle stature, of darkish-brown or yellow complexion, with black straight hair, broad skull, large nose, wide rather than high forehead. He is of quick, adaptive intelligence, and specially qualified for trade. The women are often handsome with erect carriage, regular features, and fine dark eyes. Only a part of the Armenians live in Armenia, most of them having been long dispersed all over the world. Yet is their essential national cohesion and indissolubility of national character almost as strong as is that of the Jews, though it has not had such unremitting fires of persecution to anneal it. The Armenians at the present day are to be found in Russia, Persia, and India; in the great commercial cities of the Mediterranean; in Hungary and Galicia; in London, and other chief cities of Europe and of America, occupying posts as money-changers, bankers, and merchants, and also as artisans and porters. At Venice are the Mechitarists (q.v.). Tiflis and Constantinople have more Armenians than any other town in or out of Armenia. In Turkish Armenia Kurds predominate. Among the foreign invaders implanted in Armenia are the Turks, mostly engaged in agriculture; the nomadic Kurds; in the SE. the Tatars; Nestorians occupying the mountains of the Persian frontier, and speaking a Syriac dialect; Georgians in the north. Jews and gipsies are also scattered throughout Armenia. The Armenians themselves are at home mostly shepherds and tillers of the soil, living in low mud-built cottages or underground dwellings, very meagrely furnished. The houses are built at the side of or round a small courtyard, the rooms with no apertures for light except into the yard. The cattle sometimes house with the family. In summer the roof is utilised for smoking, eating, and sleeping. Armenian women are not secluded like Moslem women. The women, seldom the men, weave carpets, silk and woollen stuffs, stockings, horse-coverings, shawls, &c., but especially lace, for which gold and silver threads are obtained from Russia. Long centuries of oppression and almost servitude have very much sapped the spirit of the people.

History.—The Armenians called themselves Hai (from Haik, son of Torgom, great-grandson of Japheth, son of Noah), and their country Hayastan; the name Armenia being conferred by the Medes, who applied this, the name of a single obscure clan, to the whole land. They have been known as a nation under this name since the time of Herodotus, and probably earlier. After being ruled by kings of their own, they fell successively under the Assyrian, Median, and Persian empires, retaining under the Persians their own princes, and merely paying tribute to the Great King. Having, under Digran or Tigranes, become the centre of an empire extending from the Orontes to the Caspian, Armenia was shattered by the Roman Lucullus, who penetrated to Artaxata at the NE. of Ararat (69 B.C.). Shapur, the second of the Sassanid kings, conquered Armenia, but under Diocletian it was recovered for Rome, and Tiridates the Great returned to his ancestral throne. This Tiridates having been converted to Christianity by St Gregory the Enlightener, Armenia became henceforward the bulwark of Christianity in Asia. Overrun by the Persian Zoroastrians, and, after the fall of Persia, by the Mohammedan khalifs of Baghdad, sometimes supported, sometimes abandoned, by the Byzantine emperors, and a prey to internal dissensions, Armenia yet re-emerged, in the 9th century, into a state of some importance.

In 885 A.D. Aschod I., of an old and powerful Armenian family, ascended the throne, with the permission of the khalifs, and founded the third Armenian dynasty—that of the Bagratidæ, who claim descent from King David of Israel. Under them Armenia was prosperous. The magnificent ruins of their capital at Ani, between Etchmiadzin and Kars, still testify to the transitory splendour of their kingdom. In the 11th century divisions and internal strife again began to weaken the country; till at length the Greeks seized a part of the kingdom, while the Turks and the Kurds made themselves masters of the rest—only one or two of the native princes maintaining a perilous independence. In 1242 the whole of Armenia Major was conquered by the Mongols. Leon VI., last king of Armenia, was taken prisoner by the Saracens, 1375, and died at Paris in 1393. In 1472 the eastern part of Armenia became a Persian province. Afterwards the western part fell into the hands of the Turkish sultan, Selim II.

The subsequent history of Armenia is that of devastation by the Mongols and the hosts of Timur, and of a long contest between the Ottoman sultans and Persia for the possession of that ancient kingdom. At length Russia approached from the north, welcomed by the Armenians as a suzerain preferable to either Turkey or Persia. Even before crossing the Caucasus and establishing herself in Georgia, Russia had interfered for the protection of the Armenian Christians. The Armenian patriarch Narses, too, had encouraged his people to look to Russia for protection. In 1827 the tsar wrested from Persia the whole of the upper valley of the Araxes, including Etchmiadzin. On the conclusion of peace between Russia and Turkey in 1829, when the Russians retired from Erzerum, a multitude of Armenian subjects of Turkey followed them, electing to settle in Russian territory. Under the Armenian 'National Constitution' (published 1863), an Assembly of Armenians sat at Constantinople. The local patriarch presided. Elected from all parts of Turkey, it included Committees for Civil and for Ecclesiastical Affairs. At the close of the Russo-Turkish war, by the treaty of Berlin (1878) Ardahan and Kars were ceded to Russia. Armenians in many districts were slaughtered or expelled by Kurds. During the negotiation of the Berlin treaty Great Britain entered into a secret compact with the sultan, guaranteeing Turkey the integrity of her Asiatic possessions on condition that Turkey should effect reforms and protect the Armenians from Kurds and Circassians. In 1894 a series of horrible atrocities in the Sasun district led to a European commission and remonstrances; it was estimated that by 1896 200,000 Armenians had perished. As in 1879, these atrocities greatly agitated European relations and British party politics; they led to Gladstone's last public speech (1906) and Lord Rosebery's resignation of the Liberal leadership. During the Turkish Revolution (1908) Armenians and Young Turks fraternised; but the reforms promised in 1878 and 1895 remained unfulfilled, and massacres at Adana (1909) and elsewhere added thousands to the list of victims. Massacres

on a huge scale were renewed during the great European war and the negotiations that followed. In 1916 Erzerum and other places in Turkish Armenia fell to the Russians, but were retaken in 1918 by the Turks, who also overran much of Russian and Persian Armenia. British troops occupied Armenia at the end of the war. On their withdrawal the Armenians became embroiled with Turks, Kurds, and Azerbaijan Tatars. A nucleus for an independent Armenia, the republic of Erivan (Russian Armenia) was for a short time part of the federal Transcaucasian republic (with Georgia and Azerbaijan), but separated in 1918. Recognised in 1920, it was sovietised in the same year, and overrun by Turks and Russians. Under the treaty of Sèvres President Wilson assigned a boundary to Turkey in the vilayets of Trebizond, Erzerum, Bitlis, and Van. But so far were the Armenians from freeing their Turkish provinces that by the treaty of Kars they had to cede to Turkey the Russian government of Kars and part of Erivan. With one-seventh of the area that President Wilson had assigned to it the republic once more joined with Georgia and Azerbaijan in 1922 to form a Transcaucasian federation, itself a member of the Russian Soviet Union. But this reduced area was not out of proportion to the reduced numbers of the people. By massacre and by flight to Erivan and elsewhere it is estimated that the Armenian population of Turkey fell from 2,000,000 to 200,000, about half in Constantinople. A decree in 1924 forbade them to live east of a line from Samsun to Selefke, so that Turkish Armenia ceased to have an Armenian population. Meanwhile the Soviet authorities, with some outside help, have done something by irrigation works to enable the republic of Hayastan to support its increased population.

The Church.—Christianity in Armenia dates from St Gregory Illuminator (q.v.), who early in the 4th century converted King Tiridates and a large part of the people. In the same century Armenian Christians were found studying at Athens. Christianity was further confirmed in Armenia by Mesrob's translation of the Bible into the Armenian language in the 5th century. In the ecclesiastical controversy concerning the twofold nature of Christ, the Armenian Christians refused (491 A.D.) to accept the decisions of the Council of Chalcedon, and constituted themselves a separate church, which took the title of Gregorian from Gregory himself. For several centuries a spirit of scientific inquiry, especially in theology, manifested itself amongst them to a far wider extent than in the other eastern churches. Their greatest divine is Nerses of Klah, belonging to the 12th century. The Roman Catholic popes at various times, especially (1145, 1341, 1439) when the Armenians accepted the help of the West against the Mohammedans, tried to persuade them to recognise the papal supremacy; but only in 1439 was union with Rome accepted by the scattered members of the Armenian Church outside of Armenia, on the basis that, while assenting to the dogma of the two natures, they should retain their national and ritual peculiarities. The Armenian Church was thus split up into two communions—the Gregorian or 'orthodox' (really monophysite, if not also adoptian), and the Uniats or United-Catholics, fanatically opposed to each other. The dogma of the pope's infallibility induced for a time dissension among the united party. The theology of the non-united Armenians, four times as numerous as the others, attributes only *one* nature to Christ, and holds, with the Orthodox Greek Church that the Spirit proceeds from the Father alone. (See GREEK CHURCH.) With respect to the 'seven sacraments,' it entertains the peculiar notions that at baptism one must be sprinkled three times, and as often dipped; that confirmation is to be conjoined with baptism; that the Lord's Supper must be celebrated with pure wine and unleavened bread; that the latter, before being handed round, must be dipped in the former; and that extreme unction is to be administered to ecclesiastics alone, and that immediately after (and not before) their death. It believes in the worship of saints, but not in purgatory. It exceeds the Greek Church in the number of its fasts, but has fewer religious festivals. Divine service is held in Turkey chiefly by night. Mass is celebrated in the old Armenian language; preaching is in the new. Its sacerdotal constitution differs little from the Greek. The head of the church, whose title is Katholikos, and to whom the Armenian patriarchs of Jerusalem and Constantinople are subordinate, resides at Etchmiadzin ('the Son of God come down,' the scene of St Gregory's vision), near Erivan, the ecclesiastical metropolis of the Armenian nation since 302 A.D., claiming to be the world's oldest monastic foundation. Etchmiadzin is an educational centre, possessing a rich library and a state university. The Katholikos used to be chosen by the tsar from two candidates elected by the whole people. The Katholikos of Sis in Cilicia once claimed the chief patriarchate. There are also Armenian patriarchs at Constantinople and Jerusalem, Armenian bishops at Tabriz and Julfa (Isfahān). Parish priests (appointed by their congregations) marry, but not the higher clergy. Although directed by lay committees, education is largely promoted by the Church. Each monastery is supposed to have a seminary, library, printing-office, hospital, &c.

Literature.—Previous to the introduction of Christianity by Gregory (300 A.D.), the Armenians had adhered to the Assyrian or Medo-Persian system of culture; but excepting a few old songs or ballads, no remains of that early period exist. After their conversion to Christianity, the Greek language and its literature soon became favourite objects of study, and many Greek authors were translated into Armenian. The earliest inscriptions are cuneiform. At a later period the Greek alphabet was used by the West, and Syriac by the East Armenians. In the beginning of the 5th century, St Mesrob, along with Sahak the Great, directed the Armenian translation of the Bible, esteemed the highest model of classic style. The most flourishing period of Armenian literature extends from the 4th to the 14th century. The numerous Armenian theological writers and chroniclers of this era supply materials for a history of the East during the middle ages which have hitherto been too much neglected. These Armenian writers generally copied the style of the later Greek and Byzantine authors. In the 14th century literature began to decline, and few remarkable works were afterwards produced; but since their dispersion, the Armenians have ever cherished their national literature. Translations of several Greek authors, made in the 5th century, have been partly preserved, and contain some writings of which the originals have been lost—such as the Chronicle of Eusebius; the Discourses of Philo; Homilies by St Chrysostom, Severianus, Basil the Great, and Ephraem Syrus; the Demonstration of Irenæus (discovered in Armenian at Erivan in 1904). Among philosophical and theological writers may be mentioned: David, the translator and commentator of Aristotle, Esnik, and Joannes Ozniensis. The *Vitæ Sanctorum Calendarii Armeniaci* (Lives of Armenian Saints, 12 vols. Ven. 1814) contains many notices of the history of Armenia. A considerable stirring of intellectual and even literary activity has recently manifested itself in northern Armenia and Constantinople. Among recent poets Archag Tchobanian (born 1872) is eminent. Ar-

menian forms a branch of the Indo-Germanic group of languages. (See PHILOLOGY, p. 99). It has certainly a very independent character, and has many peculiarities of structure. There are usually no distinctions of gender amongst nouns, and there are seven cases; while the verb has four conjugations and four tenses. In many respects the syntax of old Armenian, the language of literature, which is no longer a living tongue, resembles classical Greek; whereas modern Armenian, split up into four dialects, contains many Persian and Turkish words. The Eastern dialect is, as might be expected, much purer than that of Constantinople. The language has great strength and flexibility; is consonantal and harsh to the ear. The alphabet, which has thirty-six characters, usually said to have been partly formed on the Greek model by St Mesrob, seems rather to have been adapted by him from the Palmyrene alphabet. The Proto-Armenian inhabitants, who possibly included Hittite and Assyrian (Semitic) elements, were conquered by Aryans in the 7th century B.C. Arab, Seljuk, Mongol, and Tatar invasions explain the diversity of type of modern Armenians.

Appended is the verse John iii. 16, in old or ecclesiastical Armenian:

Ոչ այնպէս սիրեաց Աստուած զաշխարհ՝
մինչև զՈրդին իւր միածին եա. զի ամենայն
որ հաւատայ ՚ի նա՝ մի կորիցէ, այլ ընկալցի
զկեանսն յաւիտենականս.

See books on Armenia by Curzon (1854), Lynch (2 vols. 1901), Lehmann-Haupt (in Ger. 1910 *et seq.*), N. and H. Buxton (1914), Tchobanian (trans. 1914), Williams (1916), Aslan (trans. 1920), Nansen (1928), Bryce (4th ed. 1896) Gregory (1920), Burtt (1926); on the geology of Armenia by Oswald (1906), on the Church of Armenia by Ormanian (trans. 1912); books in French on the history by Basmadjian (1917), de Morgan (1919), and on the poetry by Tcheraz (1913), Tchobanian (1923); also *Divine Liturgy of the Armenian Church* (trans. 1870); *Treatment of Armenians in Ottoman Empire*, ed. Bryce (1916).

Armenoid, a name given to one of the human types grouped generally under the term Alpine Race. The Armenoids have broad, high skulls, abruptly flattened behind, and large often hooked noses. The type is common in the Caucasus and Asia Minor. Jews and Armenians offer familiar examples.

Armentières, a French town in Nord, 12 miles WNW. of Lille, with textile industries and trade in grain. See WORLD WAR.

Armeria. See THRIFT.

Armfelt, GUSTAF MAURITZ (1757–1814), born in Finland, distinguished himself during the war between Sweden and Russia. By the will of Gustavus III., assassinated in 1792, Armfelt was made governor of Stockholm and a member of the council of the regent. But the regent, Charles, the late king's brother, resented the influence of Armfelt. Sent as ambassador to Naples, he plotted against the regent and sought to have the young king proclaimed of age and sovereign. The plot being discovered, Armfelt fled to Russia. Under Gustavus IV. Armfelt was restored to favour and appointed governor-general of Finland; he commanded in 1806 the Swedes in Pomerania, and in 1808 the Swedish army designed to invade Norway. His plans were foiled, and he was recalled and dismissed by his patron. But in 1809 Gustavus IV. was deposed, the former regent being put in his place, and Armfelt saw that his star had finally set. Erelong he once more withdrew to Russia, where he lived in high honour, was a member of the Russian senate, and president of the (Russian) Board of Finland. See Tegner's monograph (1887).

Armida, in Tasso's *Jerusalem Delivered*, was a beautiful sorceress employed by Satan to seduce the crusaders at Jerusalem, who for love of Rinaldo became a Christian.

Armillary Sphere, an instrument intended to show the constitution of the heavens and the motions of the heavenly bodies. It consists of a number of rings fixed together so as to represent the principal circles of the celestial sphere, and these are movable round the polar axis within a meridian and horizon, as in the ordinary celestial globe. By means of this instrument—now superseded, even for purposes of instruction in astronomy, by the celestial globe (see GLOBES)—Ptolemy and astronomers down to Tycho Brahé made many of their observations.

Arminius (*c.* 18 B.C.–*c.* 19 A.D.), a famous chief of the German Cherusci, who in 9 A.D., in a three days' battle in the all but impassable 'Teutoburg Forest,' probably near Detmold, annihilated the whole Roman army under Varus. In two campaigns in 14 and 16 A.D. Germanicus reduced Arminius to straits, but was recalled by Tiberius in 17; and no Roman army ever afterwards penetrated into the heart of Germany. Arminius fell about 20 A.D. in an intestine feud amongst the German tribes. The Cherusci inhabited part of what is now Hanover and Brunswick; and Arminius had in youth learnt the secrets of Roman warfare as commander of a body of Cheruscan allies in the Roman service.

Arminius, JACOBUS (Latinised from Harmensen), the founder of Arminianism, was born in 1560, at Oudewater, in South Holland, studied at Utrecht, at Leyden, at Geneva under Beza (a rigid Calvinist), and at Basel. In 1586 he travelled into Italy; and on his return to Amsterdam (1588) was ordained a minister. Shortly after this he was commissioned to defend the doctrine of Beza on predestination against proposed changes, and in the end came to adopt the opinions he had been commissioned to confute, though he long maintained that they were not inconsistent with the doctrinal standards of the Dutch Reformed Church. In spite of opposition from the Conservative party, he was in 1603 made professor of Theology at Leyden, the great training-school for the Dutch clergy. His chief opponent was his colleague Gomar (q.v.). In 1604 Gomar attacked his doctrines, and from that hour to the end of his life, Arminius was engaged in a series of bitter disputes with his opponents, maintaining that God bestows forgiveness and eternal life on all who repent of their sins and believe in Christ; he wills that all men should attain salvation, and only because he has from eternity foreseen the belief or unbelief of individuals, has he from eternity determined the fate of each. On the other hand, Gomar and his party, appealing to the Belgic Confession and the Heidelberg Catechism, maintained that God had, by an eternal decree, predestinated what persons shall, as being elected to salvation, be therefore awakened to repentence and faith, and by grace made to persevere therein; and what persons shall, as being rejected (*reprobati*), be left to sin, to unbelief, and to perdition (see PREDESTINATION). All the pulpits in Holland now thundered against the heretic, though he was not without friends and backing; in 1607 he was 'Rector magnificus' of the university. In 1608, Arminius himself applied to the States of Holland to convoke a synod for the purpose of settling the controversy, but, worn out with illness and anxiety, he died on the 19th of October 1609, before it was held. Arminius, who was admittedly

a faithful pastor and a devout Christian, was doubtless much less Arminian than his followers. He had not elaborated a complete system of anti-Calvinistic doctrine, but the famous 'Five Articles' of his disciples are the logical results of his teaching.

After his death his followers gained strength, and boldly asserted their views, but still remained in a minority. In 1610 they presented to the assembled States of the provinces of Holland a 'Remonstrance'—from which they were styled 'Remonstrants'—which contained the following propositions: (1) That God had indeed made an eternal decree, but only on the conditional terms that all who believe in Christ shall be saved, while all who refuse to believe must perish; so that predestination is only conditional. (2) That Christ died for all men, but that none except believers are really saved by his death. The intention, in other words, is universal, but the efficacy may be restricted by unbelief. (3) That no man is of himself able to exercise a saving faith, but must be born again of God in Christ through the Holy Spirit. (4) That without the grace of God, man can neither think, will, nor do anything good; yet that grace does not act in men in an irresistible way. (5) That believers are able, by the aid of the Holy Spirit, victoriously to resist sin; but that the question of the possibility of a fall from grace must be determined by a further examination of the Scriptures on this point.

This last point, left as an open question, was decided by the Remonstrants in the affirmative soon afterwards (1611). Whereupon the Gomarists (Calvinists) put forth a strong 'Counter-remonstrance,' asserting plainly absolute predestination and reprobation. After several fruitless discussions, the States of Holland, in January 1614, issued an edict of full toleration for both parties, prohibiting at the same time the continuance of the controversy.' The Counter-remonstrants refused to submit to this edict, and the strife soon became so furious, that in 1617, or soon afterwards, the Arminians found it necessary to guard themselves from personal violence by appointing a safeguard of militia-men (*Waardgelders*). The controversy now merged in the strife of party politics. The ambitious Maurice of Orange took advantage of the passions of the majority to crush his opponents of the republican party, whose leaders were adherents of the Arminian doctrines. Several Arminians were put to death (Oldenbarneveldt), and others were imprisoned (Grotius). In these circumstances, the Synod of Dort was held (1618–19), attended by selected representatives from the Netherlands, England, Scotland, the Palatinate, Switzerland, Nassau, East Friesland, and Bremen. From this convocation (January 14, 1619) the thirteen Arminian pastors, with the learned and eloquent Simon Episcopius at their head, were excluded. The doctrines of the Counter-remonstrants were embodied in ninety-three canons; the Belgic Confession and the Heidelberg Catechism were confirmed as authorities for the reformed churches of the Netherlands; and three hundred Arminians (chiefly preachers) were expelled from office. In consequence of this decision, the defeated party sought shelter abroad, but under Maurice's successor (1630) they were again tolerated in Holland.

Since that time, the Remonstrants (or Arminians) in Holland have inclined more and more towards freedom of thought on religious questions, and independence in church government. The rejection of all creeds and confessions; the free interpretation of the Scriptures; a preference of moral to doctrinal teaching; Arian views respecting the Trinity; the virtual rejection of the doctrines of original sin and imputed righteousness; and the view of the sacraments as merely edifying forms or ceremonies—all are characteristic. In their theological school, established at Amsterdam in 1634, eminent theologians such as Episcopius, Limborch, Clericus, and Wetstein taught, bringing their influence to bear on Germany, Britain, and on other Protestant countries. As the national church in Holland became less and less distinctively Calvinist, the separate testimony of the Remonstrants became the less necessary, and save at Rotterdam and Amsterdam they are few in numbers. Their views were akin to those of many of the Greek fathers, of the semi-Pelagians, and of Erasmus. In the 18th century, a number of Arminians went formally over to the Arian or Socinian position, departing further and further from the Reformed theology. But while the Arminians were dwindling away as a distinct body, their influence was widespread in the orthodox churches. Arminian influence became marked in the Church of England before Laud's time (see LATITUDINARIANS, HALES). Their tenets on predestination were adopted (with some modification) by Wesleyans and General Baptists, as well as by many individual members of Calvinistic churches. Wesley's movement gave Arminianism a new life and some new features; and, thus modified, Arminianism became the theology of Methodism. Aversion to the harsher aspects of Calvinism is characteristic not merely of the Broad Church, but of 'modern theology' generally. Since the downfall of Jansenism, Arminian views are also the prevalent doctrine in the Church of Rome.

The works of Arminius were translated in 1825–56, also the Life of him by Brandt (1854). The standard history of the Remonstrants is that by Regenboog (1780). See Schaff's *Creeds of Christendom*, Motley's *Barneveld*.

Armistice, a temporary suspension of hostilities between two armies, or two nations at war, by mutual agreement. It takes place sometimes when both are exhausted, and at other times when an endeavour to form a treaty of peace is being made. A local armistice may be arranged by any part of the opposing forces; a general armistice affecting all the troops in the field can be entered into only by the commanders-in-chief or by the home governments.

Armisticio, a region, formerly a territory, of Venezuela, bordering on Colombia. Armisticio is fertile and abundantly watered by several important tributaries of the Orinoco.

Armitage, EDWARD (1817–96), historical and mural painter, was born in London, and studied in Paris and Rome, being for a time a pupil of Delaroche. In 1843 his cartoon on 'Cæsar's Invasion of England' won a prize. He became A.R.A. in 1867, R.A. in 1872. Most of his contributions to the Academy exhibitions were on scriptural subjects. His most notable frescoes are in St John's Roman Catholic church in London and in the Houses of Parliament.

Armor'ica, the country of the Armorici, who, in Cæsar's time, occupied the coast of Gaul between the Seine and the Loire; later the name was confined to Brittany (q.v.). The *mor* in Armorica is obviously the Celtic word for 'sea,' from the same root as Lat. *mare*, and the Slavic *mer* in *Pomerania*, meaning 'coastland.'

Armour is a general term for the apparatus of personal defence, as distinguished from arms or weapons of offence. The commonest implement of defence in prehistoric and early historic times in Europe was the shield. The earliest known shields are of bronze, and circular, and were held in the left hand by a handle under the central boss. In addition to the shield, the early Greeks used greaves and helmets of bronze, and to these, in later times, a cuirass of breast and back plates was

added. The Romans added shoulder-guards to the cuirass, which was modelled to the bust, and furnished with a series of pendent plates, reaching almost to mid-thigh. It is not known when the tunic of interlinked rings, or coat of mail, first made its appearance in Europe. Flexible cuirasses were worn by the Roman *Hastati*, but there is no distinct evidence of their construction. Portions of

Fig. 1.—From Brass of Sir John de St Quintin, 1397:

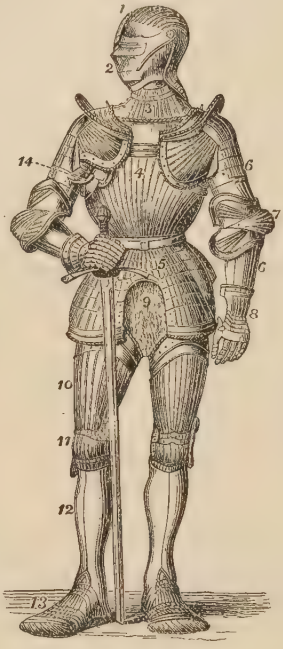


Fig. 2.—Complete Suit of Plate-armour, beginning of 16th Century:

1, helmet; 2, visor; 3, gorget; 3*a*, camail; 4, breastplate; 5, skirt; 6, arm-pieces; 7, elbow-piece; 8, gauntlet; 9, hauberk; 10, thigh-piece; 11, knee-piece; 12, greaves; 13, sollerets; 14, lance-rest; 15, belt.

chain-mail, formed of small riveted rings interlinked together, have been found in the mosses of Sleswick, associated with articles of decoration, exhibiting the influence of Roman art of about the 3d century. It seems unquestionable that chain-mail was in general use among the Northern nations long before the crusades. The enthusiasm engendered by the Holy Wars, however, gave a general impetus to the adoption of this species of personal defence, and under the feudal system, which prescribed for every man the arms and armour conformable to his condition, the period of the principal development of body-armour was reached. Disregarding the equipment of the common mass of combatants—which generally consisted of a suit of leather or other material quilted or stuffed, or padded with cotton or waste, or studded or mascled with small plates or scales of iron—the suits of armour worn by the knights and nobles were of costly workmanship, and splendidly adorned. In armour, as in dress, the changing fashions of the different periods are strongly marked. At the time of the Norman Conquest of England, or about the middle of the 11th century, the armour consisted of a *hauberk* or tunic of mail for the body, hose of mail for the legs, a conical helmet with nasal, and a circular or kite-shaped shield. This continued to be the style of equipment throughout the 12th century. By the assize of arms of Henry II. in 1181, every knight was bound to have as many coats of fence (*lorica*), helmets, shields, and lances, as he had knights' fees in his domain; and the freemen and burgesses were to have habergeons or *gambesons*, and iron caps. The Scots had not generally adopted the use of defensive armour, for at the battle of the Standard, in 1138, the Earl of Strathearn is represented as saying: 'I wear no armour, yet they who do will not advance beyond me this day.' Towards the end of the 12th century, the round shield becomes rare, and the kite-shape gives way to the triangular or flatiron-shaped shield, and the conical helmet to the cylindrical and flat-topped form. In the first part of the 13th century, the hauberk and hose, or long *chausses* of mail, remained the usual body-armour of the knight; but in the second half of the century, the mail defences of the limbs began to be reinforced by portions of plate attached as shoulder-pieces, and elbow and knee pieces, to which were speedily added greaves or shin-pieces. The hauberk was made, in the beginning of the century, with a continuous coif for the head, and gloves not divided into fingers, but having an aperture in the centre of the palm. The coif of mail, which at the commencement of the 13th century was flat-topped, became round-topped in the second half of the century, and instead of it, the hood of mail, with a wide tippet which fell over the hauberk on the shoulders, was coming into use. Over the coif or hood, the great helm was worn in action, completely encasing the head, and perforated in front with small apertures for light and air. In the early part of the century, the cylindrical, flat-topped helm was the common form; in the middle of the century, the round-topped form prevailed; and by the end of the century, the top had assumed more of the form of a sugar-loaf. The armour was also extended from the man to the horse, which had a couverture of chain-mail fitting tightly to the head and neck, and falling loosely over the body.

The 14th century was the period of the greatest development of body-armour, marking the transition from the coat of mail to the panoply of plate. The knightly equipment at this period necessitated the wearing of four or five different casings or defences over each other. Below the chain-mail, which was still worn, the quilted gambeson was needed to soften the pressure; over the mail was the corselet, with other reinforcements of plate, and over all, a second quilted garment, which might or might not be covered by the surcoat, usually worn uppermost for the purpose of displaying the knightly emblazonment. The hauberk now terminates at the neck, which is defended by a gorget of scale or plate. An ample corselet protects the breast, and the shoulders, elbows, and hands have each their special defences, either of articulated plates or single pieces. The reinforcements to the chausses or hose of mail which protected the legs in the previous century, gradually give way to complete defences of plate, the greaves fitting to the knee-pieces, and these to the thigh-pieces, till in the latter part of the century the legs were completely incased in tubular *jambards*, or jointed casings of plate, which opened upon hinges on the outside of the leg, and fastened on the inside. The feet were inclosed in *sollerets*, or shoe-like casings, of articulated plates, the long-pointed toe of the solleret marking the second half of the century. Under the pointed or dome-topped helm, the coif or hood of chain-mail is discarded for the *bassinet*, a high-peaked cap of steel, round the lower part of which is laced the upper edge of the *camail* or tippet of chain-mail falling down over the neck and shoulders. The helm, when placed over the bassinet, completely covers the head and face; it is perforated with clusters of small holes for breathing,

and for sight is furnished with a narrow cleft extending from temple to temple. Before the close of the century, the visored bassinet and camail were often used instead of the unwieldy helm. The shields were still triangular, but shorter than in the previous century. On the shield and surcoat were emblazoned the wearer's armorial bearings, and the military belt of this period, which confined the lower part of the surcoat, was often the most brilliant and costly part of the equipment, formed of elaborately worked plaques of precious metals, jewelled or enamelled, and furnished with pendants. The horses were almost as closely clad in plate as their riders; and in consequence of the weight they bore, a fall was often fatal to them both. In the 15th century, the development of plate-armour proceeded until, towards the middle of the century, body and limbs were completely enveloped in an articulated casing of iron plates.

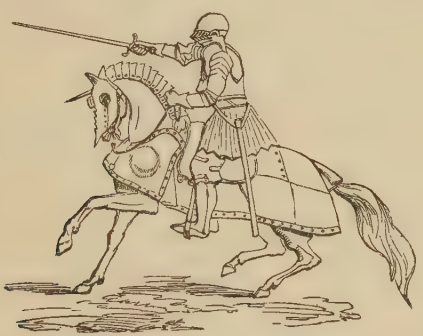


Fig. 3.—Suit of Armour presented by the Emperor Maximilian to Henry VIII., showing the Horse-armour.

Articulations fitted to the upper parts of the arm-plates were carried over the shoulders, and the joints were protected by fan-shaped projections. The body, below the breast and back plates, was enveloped in a skirt of wide, hoop-like plates called *tassets*. To the lower part of these there were attached a series of more loosely hanging plates called *tuilles*. The leg defences are angular in front, the long-pointed toes of the sollerets are shortened, and the gauntlets formed with articulating plates down to the points of the fingers. The bassinet and camail are being discarded in favour of the *salade*, a species of skull-cap, worn with a gorget and chin-piece separate from it. In this century, the introduction of gunpowder marks the period from which body-armour began to decline in importance, as being no longer proof against the new weapons of attack. The whole system of warfare was changed, tactics took the place of chivalry, and fortification of strong places against artillery superseded the system of iron-clad men. The full panoply of armour was still kept up for the joust and the tournament, but for actual service the tendency was henceforth in the direction of its disuse. In the 16th century, so prolific in changes, there was no longer the same uniformity of equipment. Instead of the long encircling skirt of hoop-like tassets, with tuilles attached, there is now a shortened skirt with a series of sliding and overlapping plates depending over each thigh, from the waist to the knee. The head defences are vizored helmets or salades and morions. In the 17th century, officers and pikemen still retained the cumbrous body-suit of breast and back plates, with the short skirt of tassets and thigh-pieces; and in the 18th century, body-armour had been reduced to a mere embellishment of the military parade.

The most authentic sources of information as to the changing fashions of body-armour in the middle ages are illuminated manuscripts, the Bayeux tapestry, and monumental effigies and brasses in churches.

See works by Meyrick (1842), Hewitt (1855–59), Bontell (1869), Lacombe (1874), Brett (1894), Laking (1920–22); and for modern armour, Dean (1920).

Arms or ARMORIAL BEARINGS. See HERALDRY.

Armstrong, JOHN (1709–79), physician and poet, was born in Castleton Manse, Liddesdale, Roxburghshire; took the Edinburgh M.D. in 1732; and commenced practice in London. In 1736 he published a nauseous poem, *The Œconomy of Love*, and in 1744 his principal work, *The Art of Preserving Health*, a didactic poem in four books. See I. A. Williams, *Seven 18th Century Bibliographies* (1924).

Armstrong, LORD (WILLIAM GEORGE ARMSTRONG; 1810–1900), inventor, born at Newcastle, was bred a lawyer, but in 1840–45 invented a hydraulic engine and crane and electric apparatus. F.R.S. (1846), he commenced the Elswick Engine-works, Newcastle. This large establishment was soon to be famous for its ordnance, and especially the Armstrong gun, of which the barrel is built up of successive coils of wrought-iron. Till 1863 there existed a kind of partnership between government and the Elswick firm, Armstrong being knighted in 1858. The firm, which since 1882 comprises ship-building, has a branch (for military engineering) near Pozzuoli. In 1887 Armstrong was created Baron Armstrong. See WHITWORTH.

Army, a body of armed men organised and disciplined to act together for purposes of warfare on land in accordance with the will of one man. An army is organised in the sense that it is a whole composed of a large number of individual parts or powers arranged so that their aggregate force may be exerted in any required direction. The individual parts derive their value from this capacity for concerted action, and in order to maintain it must be systematically combined and inter-dependent. Discipline, on the other hand, is concerned with the element of human will. Through authority it secures the subordination of many wills to the single will of the general. Through training in evolutions and the use of weapons it secures that this single will shall be accurately expressed in a series of calculated and orderly actions. By these means large bodies of men are induced to perform in unison the evolutions of the march and battlefield under the absolute direction of a single commander. Armies may fall short of the full standard of cohesion and *moral* implied by this definition, but to deserve the name they must attain it in some degree; and generally speaking the object of all military operations is to destroy these elements in the opposing force. Technically the organisation of an army is of two kinds, tactical and administrative. The former enables the leader of an army to transmit his orders to three or four subordinate commanders, who pass them on to three or four others under them, until, through a regular chain of responsibility, the original impulse is communicated to the private soldier (see TACTICS). The latter, in a similar manner, divides the army into groups of gradually decreasing size, so that the men may be efficiently paid, fed, clothed, and armed (see *Army Administration*). The present article will treat only of the constitution and establishment of armies, and indicate their gradual historical development. Technical terms generally, as well as all the component elements of the army in *personnel* and *matériel*, and the organisation and duties of the troops, will be found noticed under their proper headings; the tactical positions of an army are defined below.

Ancient Armies.—The earliest regular military organisation is attributed to Rameses II., known

to history also as Sesostris, who ascended the throne of Egypt about 1300 B.C. He is said to have divided Egypt into thirty-six military provinces, and established a sort of militia or warrior caste, to each member of which he allotted lands for the support of himself and his family. His army took the field in four territorial divisions, each called after the name of a god, and was supported by the sea-power of a fleet. If later historians may be believed, his conquests carried him beyond the Ganges, through Tartary, and into Europe from north of the Caspian. After him, little further progress was made in military art until the *Persian* empire arose. Its soldiers introduced the mass-formation, with cavalry in intervals of squares; but the most important feature of the Persian organisation was the establishment of what was practically a standing army, divided as garrisons throughout the conquered provinces, and under the control of military governors distinct from the satraps. In time of war this standing army was augmented by a general levy which included the tributary nations, and therefore resulted in a heterogeneous collection of barbarous and undisciplined peoples; a source of weakness which caused the defeat of Xerxes' numerically powerful army by the Greeks. In *Greece*, it was not a standing army, but a national militia, subjected to an almost continuous training in the field that gained Marathon, Platæa, and Mycale. Their discipline was the fruit of a highly specialised moral and physical education; but nevertheless, judged by later standards, was not remarkable. Organisation and tactics were closely studied, and the Phalanx (q.v.), the basis of Greek military formations, was successively modified and improved by the various states. Sparta was the inventor of this particular mass-formation for foot-soldiers. The Athenians made it more mobile and added lighter troops to cover its attack. Their cavalry did not come into existence until after the Persian War, and was at no time very efficient. The charge of the Athenian army at Marathon showed the crowning excellence of their rapid system of attack; and Miltiades, their leader, is said to have first invented the 'double step,' to increase the momentum of a phalanx when rushing on the enemy. The Thebans introduced the column formation, which, being deeper and narrower than the phalanx, was intended to pierce the enemy's line at some one point, and throw them into confusion. Philip, the father of Alexander the Great, established in *Macedonia* the world's second standing army; and, as a further change, made the phalanx deeper and more massive than it had been among the Lacedæmonians. He brought into use the Macedonian pike, a formidable weapon 24 feet in length. With a phalanx sixteen ranks in depth, six rows of men could present the points of these long pikes protruding in front of the front rank, forming a bristling array of steel terrible to encounter. Meanwhile a more western power was developing what was perhaps the most perfect organisation in the annals of military history. The *Romans* initiated changes in army matters which have had a widespread influence throughout the civilised world. About the period 200 B.C., every Roman from the age of 17 to 46 was liable to be called upon to serve as a soldier; the younger men were preferred, but all were available up to the middle time of life. They went through a very severe course of drill and discipline to fit them alike for marching, fighting, camping, working, carrying, and other active duties. Every year the magistrates sent up the names of eligible men, and tribunes selected a certain number from this list to form Legions (q.v.) or army corps. The Roman legion retained this militia character until Augustus established a permanent defensive force on the frontiers. In its best days, it excelled all other troops alike in discipline and in *esprit*. So long as none but freemen were enlisted the position of a legionary was one of honour; but when, in the course of the civil wars, it became necessary to supply the armies of ambitious leaders with large drafts of slaves and criminals, the character of the body naturally fell with that of the individual. With a gradual laxity in discipline, the decline of the Roman power commenced. The undercurrent of insubordination resulted in reverses, and though discipline was revived spasmodically under great commanders, it ultimately died out.

Medieval Armies. — With the decline of the Roman power all that remained of scientific warfare was lost for a time. The northern invaders made little use of tactics, but relied chiefly on their personal bravery and on the impetuosity and weight of their attack in column. The army, among the Franks and Germans was the nation. Every freeman bore arms alike as a duty and as a privilege. Kings and generals were entrusted in time of war with an absolute power, which the nation resumed with the return of peace. The conquerors of the Roman Empire at first recognised no superior save the community, of which all conquests were the property. What all had aided to acquire all demanded equally to share. Hence arose a division of the conquered territory, individual chiefs rewarding their own followers with gifts of the lands they had helped to conquer. The growth of a feeling that such gifts could be revoked, and that they implied an obligation to future service, marks the beginning of the Feudal period (see FEUDALISM), when national armies disappeared, and each baron had a small army composed of his own militia or retainers, available for battle at short notice. The contests of these small armies, sometimes combined and sometimes isolated, make up the greater part of the wars of the middle ages. Of military tactics or strategy there was very little; the campaigns were desultory and indecisive; and the battles were gained more by individual valour than by any well-concerted plan. The characteristics of the system most strongly opposed to the progress of military science were the undue importance attached to the cavalry, the want of organisation resulting from the numerous rival commands which made up its armies, and the shortness of the service, extending only to twenty days, or at the most three months, in every year. The Crusades (q.v.) effected some improvement in all these respects. The forces which went to the Holy Land were at first mere armed mobs, upheld by fanaticism, but ignorant of all discipline, and under leaders destitute alike of forethought and powers of combination. The reverses they sustained, however, showed the necessity for some organisation, and the extended service called attention to and developed the value of the foot-soldiers. From this period dates the modern recognition of the importance of an arm which increased under the franchise extended to the towns, and the superiority of which, since the overthrow of the Burgundian chivalry by Swiss infantry in the three disastrous battles of 1476–77, has never been disputed. The invention of gunpowder effected much less change during the middle ages than is generally supposed. When men could fight at a greater distance than before, and on a system which brought mechanism to the aid of valour, everything connected with the military art underwent a revolution. Historically, however, this great change was not very apparent until after this period. The art of making good cannon and hand-guns grew up gradually, like other arts; and armies long continued to depend

principally on the older weapons—spears, darts, arrows, axes, maces, swords, and daggers. As to army-formation, there was still little that could deserve the name; there was no particular order of battle; each knight sought how he could best distinguish himself by personal valour; and sometimes it happened that the fate of a battle was allowed to depend on a combat between two knights. No attempt was made, until towards the close of the 15th century, to embody a system of tactics and manœuvres for cavalry; and even that attempt was of the most primitive kind. Nor was it far otherwise with the foot-soldiers; they were gradually becoming acquainted with use of firearms; but, midway as it were between two systems, they observed neither completely; and the armies in which they served presented very little definite organisation.

Modern Armies.—The Turkish force of JANIZARIES (q.v.), the earliest standing army in Europe, was fully organised in 1362; but the formation of standing armies among western powers, which may be said to have introduced the modern military system, dates from the establishment of *compagnies d'ordonnance* by Charles VII. of France, nearly a century later. These companies of men-at-arms amounted, with their attendants, to 9000 men; and to them the king afterwards added 16,000 franc-archers, largely recruited from the mercenaries which growing wealth and luxury had developed. The superiority of such a force over militia forced its adoption on the surrounding states. Monarchs contracted with powerful nobles to raise, by enlistment, regiments, which were now broken up into squadrons or battalions as tactical units, the regiment remaining the administrative unit. Between the beginning of the 16th and the end of the 18th centuries the proportion of musketeers gradually increased; the pike was abandoned for the bayonet, and even the cavalry were taught to rely more on their fire than on the effect of their charge. The improvements in weapons naturally affected the formation. During the Thirty Years' War (1618–48), Gustavus Adolphus and Wallenstein adopted opposite modes of dealing with masses of infantry; the former spread them out to a great width, and only six ranks in depth; whereas the latter adopted a narrower front, with a depth of twenty to thirty ranks. In Louis XIV.'s reign, the prolonged wars introduced the larger grouping in brigades and divisions. Frederick the Great, in the next century, reduced the depth of his infantry formation to three ranks, and introduced a most rigid and exact system of tactics and drill; so that when able to manœuvre he nearly always won his battles; but when the result depended on bold and unexpected onslaughts he was more frequently a loser than a winner. He, however, greatly improved the cavalry tactics, and restored to this arm a reliance on the effect of a rapid charge, while the introduction of horse artillery added to its power.

The French Revolution effected almost as great changes in the military as in the political organisation of Europe. Hitherto armies had been deprived of mobility on the march by the system of supply magazines and hampered in battle by the method of line tactics and a mistaken adherence to mere manœuvring. Napoleon destroyed these traditions, and devised the policy of living on the country and aiming at the direct destruction of the enemy's army. At the same time a great change took place in the relation of armies to the state. They now consisted no longer of mercenaries paid out of the proceeds of their victories, but of annual contingents of the native population. As early as 1793 France had almost exhausted her supply of voluntary recruits, and compulsory requisition was introduced. In 1799 systematic conscription was made the sole law; the population was classified according to age; every citizen was declared liable to five years' service, and all between the ages of 20 and 25 were enrolled. The immense advantage which this terrible power gave Napoleon compelled other nations to follow the example of France, and in Europe voluntary enlistment has since survived in England alone, with a break during the Great War. From this period also dates the introduction of the short service and reserve system. Restricted under the treaty of Tilsit (1807) to 43,000 men with the colours, the Prussian strength was nevertheless annually added to by Scharnhorst, who first developed the idea of sending the trained soldiers back to their homes at the end of the year, replacing them with fresh recruits, thus, while keeping the establishment within the required limits, producing a steadily growing reserve. In spite of this demonstration of strength the other powers did not at once accept the Prussian model. Finally, the lesson of Sadowa induced Austria to adopt it in 1868, and the events of 1870 and 1871 led to its establishment in S. Germany, Italy, and France. Now, in most nations will be found an army of reserve, intended to augment the standing army, or first fighting-line, from a peace to a war strength, and consisting of two classes—those waiting for an immediate call to arms if required, and those constituting the militia or second line of reserves—the entire effective military power of the state (see MILITIA, LANDWEHR, the latter dating from 1813). The principles of organisation were also modified in the large armies which took the field in the beginning of the century. In 1792, *mixed divisions*, composed of all arms, had been introduced, and in 1804 Napoleon organised, under his marshals, *corps d'armée*, each in itself a complete army. The Prussian model has been accepted as the best type of Army Corps (see below), and in that country originated also the territorial system now generally adopted by all European powers. A modern army, when mobilised, consists of several such corps and a mass of cavalry placed under one commander. A smaller force taking the field, consisting of one corps or less, is generally called an *expeditionary force;* this expression is also frequently used to designate the British regular army.

It may be convenient to mention here certain distinctions in the application of the word 'army.' A *Covering Army* is encamped or in cantonments for the protection of the different passes or roads which lead to the town or other place to be protected. A *Siege Army* is ranged around or in front of a fortified place, to capture it by a regular process of besieging. A *Blockading Army*, either independent of or auxiliary to a siege army, is intended to prevent all ingress and egress at the streets or gates of a besieged place. An *Army of Observation* is posted to watch a doubtful neighbour country, such as the French force on the Italian frontier at the opening of the Great War, or a threatening enemy force at a distance. An *Army of Reconnaissance* has a special duty at a particular time and place, to ascertain the strength and position of the enemy's forces. A *Flying Column* is a small army carrying all its supplies with it, so as to be able to operate quickly, and in any direction, independently of its original *Base of Operations* (q.v.).

THE BRITISH ARMY.—The primitive national army of the English, as of other Teutonic nations, consisted of the mass of free landowners between the ages of sixteen and sixty; it was called in the Karolingian legislation by a form of the still existing name of *landwehr*, and known in England as the *fyrd*. Its term of service was fixed by custom at two months in the year. Its duties were to act within the limits of the kingdom to repel invasion, or within its counties to assist the sheriff. The Conquest introduced the feudal system,

the kingdom being divided into some 60,000 *knight's-fees*, which carried the obligation of forty days' service a year, at home or abroad. By the side of this cavalry force or feudal levy, the old *fyrd* or general levy continued to exist. But gradually the unfitness for foreign warfare of a composite force thus restricted in the time and place of its service compelled recourse to other methods. A *escuage* or fixed fine was substituted for personal service; mercenaries were raised by contract with a powerful baron or experienced captain; irregularities such as impressment and forced contributions, though declared illegal, were common from the reign of Edward III. to the time of the Stuarts. At this point the old general levy, or militia as it had come to be called, though unserviceable and disorganised, came into prominence as the chief potential factor in the Civil War. In spite of its uselessness, the question of its control was the principal cause of the war between Charles I. and the parliament; and the bitter feeling, when the king billeted his soldiers on the people and imposed martial law in time of peace, culminated in the presentation of the Petition of Rights (q.v.). In the event the militia was reorganised by statutes of 1662, which asserted the royal prerogative but transferred the chief powers to the lieutenants of counties, who retained them until they were revested in the crown in 1871. The British standing army dates not from 1661, but from 1645; not from Monk's regiment, but from the famous 'new model' which was established by act of the Long Parliament and maintained in substance until the Restoration. This army, which was modelled by Cromwell, consisted of some 80,000 men, mostly of the yeoman class, the most effective army, probably, that England has ever possessed; but the cost and the preponderating political influence of such a force produced finally a still deeper discontent. Consequently, on his restoration, Charles II. found himself at first compelled to agree to the abandonment of all the army except a kind of bodyguard or household brigade of 5000 men, sanctioned by the parliament. Monk's Coldstream regiment was retained, and the first regiment of guards was formed; the Earl of Oxford's Royal Regiment of Horse Guards (Oxford Blues) stood first upon the establishment, and two troops of cavalry raised by Charles formed the originals of the present Life Guards. The continuity of the Coldstream regiment's existence was practically unbroken by the ceremony of laying down its arms on Tower Hill and taking them up again; and this famous corps therefore forms the link that binds the 'new model' to the army of George V. In 1662 that famous corps now known as the Royal Scots, the representative of the Scots Brigade of Gustavus Adolphus, was brought over to England, and took its place at the head of the infantry of the line. The next regiments in order of precedence are the Queen's (Royal West Surrey) and the Buffs (the old Holland Regiment). Throughout Charles's reign the establishment grew, in spite of parliament's open jealousy of such an increase; and although the Commons by holding the purse virtually held the power, Charles's army numbered at his death 16,500 men. With Monmouth's rebellion as an excuse, James II. raised its strength to 20,000, some 13,000 of whom were kept in camp at Hounslow.

Although a few regiments were retained at the Restoration in 1660, it was only after the succession of William III. that, under the operation of the 'Bill of Rights,' the keeping up of a standing army was put on the legal footing which has been practically maintained ever since. The act opens with the words, 'Whereas the raising or keeping a standing army within the United Kingdom of Great Britain and Ireland in time of peace, unless it be with the consent of parliament, is against law.' To punish certain offences against military discipline, which had hitherto been enforced by Articles of War emanating from the sovereign, the first Mutiny Act was passed in 1689, to last for six months only; but it was afterwards, with a few exceptions, annually renewed until its incorporation in the Army Discipline Act of 1879 (see *Army Discipline*). In 1691 the Commons sanctioned a vote of 65,000 men, but on the return of peace in 1697 this force was reduced to 19,000. During the Seven Years' War the strength of the army rose to 67,000 at home and on the Continent, with 37,000 in the plantations and garrisons abroad. Similarly, the war of American Independence caused a great increase; but on its conclusion in 1783 the numbers dropped to the 17,000 odd at home, at which they remained until the war of the French Revolution, 1793–94. From that time to 1815 the army experienced a more or less progressive development until the numbers reached over 250,000; but after Waterloo large reductions were made. During the Peninsular war the total strength of the British forces rose to over 800,000 men, including seamen and marines, militia and volunteers, and East India Company's troops. The elasticity which permitted these enlargements and contractions was obtained chiefly by raising additional battalions to existing regiments. During the half-century which followed the last date, the actual number of regiments varied but little. Five cavalry and thirty-five infantry regiments were added in the reigns of the first two Georges. Although a train of artillery had existed for some time previous, the present Royal Regiment of Artillery dates its corporate existence from 26th May 1716, when two companies were permanently established at Woolwich; horse and field artillery were not added until the end of the 18th and the commencement of the 19th centuries. The organisation of the Engineers as part of the military branch of the Ordnance was directed by an Order of Council dated 22d August 1717; but seventy years elapsed before privates were enlisted and that arm became a corps. It was also at first under the Board of Ordnance; and hence it is that the Artillery and Engineers are still called Ordnance Corps. The outbreak of the French Revolution found the service at a very low ebb. The laurels gained in the earlier wars of the century had been tarnished in America, where two British armies had surrendered; the ranks were largely filled with pardoned criminals and released debtors; and the system of billeting caused endless complaints from soldiers and civilians alike. In the Peninsula, the army was eventually organised in divisions, virtually grouped in army corps, and the commissariat and transport were brought to great perfection. But these services were afterwards reduced along with the army, which fell from 246,000 to 72,000, and the result was the miserable state of unpreparedness which was discovered when the strain of the Crimean war came.

After the Crimean and Indian Mutiny campaigns an impressive succession of events combined to excite in this country public interest in military concerns, to keep alive the sense of weakness inspired by our Crimean experience, and to point the way to a new order of things. The French campaign in Italy in 1859 afforded no new lessons of importance, but the Prussian concentration on the Rhine in the same year awoke attention. The commencement of the great civil war in America witnessed the commencement of the serious study of the art of war in England; the Staff College had been three years in existence. But what startled and electrified Europe was the success

of the Prussian army in the Seven Weeks' War (against Austria, 1866). Then was brought home for the first time the conviction that it was possible to have an army numerically small on the peace establishment, yet capable of expansion by means of a reserve at the shortest notice, and that a new system of tactics was necessitated by the introduction of breech-loading rifles. The events of the Franco-German war of 1870–71 hastened the transition from the old to the new order of things. The work was thereafter kept steadily in hand by the War Office, under successive ministries, both Liberal and Conservative. Mr (afterwards Lord) Cardwell began it in 1871, under Mr Gladstone; Colonel Stanley continued it during Lord Beaconsfield's administration; and Mr Childers, during Mr Gladstone's second tenure of office, completed a reorganisation by his measure of 1881.

It was Lord Cardwell who laid down the broad lines of the scheme of reconstruction. His policy comprised two principal objects: the creation of an adequate reserve capable of expanding an army relatively small in time of peace into a large and efficient force on the outbreak of war, and the closer union of the auxiliary with the regular forces. Before this could be accomplished some preliminary reforms were necessary—the admission of short as well as long service, the linking of regular battalions, the abolition of purchase of commissions by officers, and the localisation of the military forces. Hitherto there had been no true reserve composed of men immediately available for service with the first line abroad. Its foundation could only be laid, as the example of Prussia showed, under a system of short-service enlistment. In England ordinary enlistment had been for life, though Parliament favoured a policy of short periods, and in 1847 definitely prohibited all engagements except for 10 years, with re-engagement for 11. In 1867 the 10 years were increased to 12; a soldier might leave at the end of the 12 years, but if he continued he received extra pay, and by good conduct could earn a pension of 1s. 5d. a day for life on the completion of the full term. The Act of 1870 prescribed a period of 12 years, to be distributed between the colours and the reserve in such proportions as the Secretary of State might determine. Lord Cardwell himself fixed it at 6 years with each; at the same time he abolished the old bounties and added 1½d. a day to a soldier's net pay. This policy was completely successful. The reserves so created steadily increased and the system, which was tested in 1878 and 1882, gave striking proof of its value during the South African war, when it provided 80,000 reservists, of whom 96 per cent. were found efficient and enabled an army of 150,000 regulars to keep the field for 15 months. The establishment for 1910–11 was 138,000 of all ranks. The abolition of purchase by officers necessarily preceded the institution of linked battalions. It was required in order to enable officers to be placed on one list for promotion with those of the linked battalions. The proposal excited an opposition remarkable in view of the patent evils of purchase, and Mr Gladstone acted wisely though arbitrarily in ending the system by extra-parliamentary means in 1871. In 1873 the old regimental system was replaced by a universal double battalion organisation, and it now became possible without unnecessary expense to retain at home the men unfitted for foreign service by reason of age or youth, and to avoid the waste and congestion at the depôts abroad. There were 69 regiments of infantry of the line, with a total before the Great War of 148 battalions, some few consisting of 4 battalions, and the remainder of 2. But the cardinal principle of the new policy was localisation. It was anticipated that this would encourage recruiting, and at the same time connect the army more closely with the people and the land. When completed in 1881 the scheme showed the country divided into territorial districts, each comprising 2 battalions of the line and 2 militia battalions, together with the volunteer corps of the area. These troops formed administrative brigades with fixed depôts which served both as local centres for recruiting and as headquarters for the militia and permanent staff of volunteers. The two line battalions were linked together, one serving at home and the other abroad. These, as well as the affiliated militia and volunteer battalions, were renamed and renumbered by territoral districts. The exceptions were the former 60th (now King's Royal Rifle Corps) and the old Rifle Brigade, in each of which the first four battalions were regulars, and the Cameron Highlanders, which had but one line battalion. In place of the former regimental numbers, territorial designations were chosen, and each regiment recruits chiefly in the territory from which it takes its title, called the 'Regimental District.' The regimental districts take their number from the senior of the line battalions belonging to them, except in the case of the King's Royal Rifle Corps and Rifle Brigade; and as they have no numbers, this has led to their district being called the Rifle Depôt.

In 1907 came the next great period of army reform. The South African war and the series of royal commissions and committees which it provoked had abundantly illustrated the necessity for changes. A scheme of reorganisation was put forward in 1904, but did not secure general acceptance; and on assuming control of the War Office in 1906, Mr Haldane proceeded to reconstruct the entire military system with the aid of the newly created General Staff. The military forces of the country as he found them were broadly divided into three lines. In the first line was the regular army, composed of an army corps of 3 divisions at Aldershot, 6 other divisions, and 4 cavalry brigades: in all of these there were serious deficiences and an absence of organisation for war. In the second line was the militia, which had been gradually brought into close dependence on the first line. Not only had the conditions of service been assimilated to those of the regular forces, but recruits were enlisted and trained by regular officers; facilities were freely granted to militia officers to obtain regular commissions, and bounties were offered to men on enlistment into the regular ranks. In these circumstances the militia was less a second line than an irregular addition to the first line. In the third line were the yeomanry and volunteers with every variety of organisation and training, and no assigned functions in peace or war. The 3 lines were uncoordinated, in different stages of training and discipline, and with no uniform system of command or even of armaments.

This organisation was completely remodelled, while at the same time the principles of the Cardwell system have been maintained and further developed. The new arrangement is of two lines closely connected, and each with a complete divisional organisation. The first line, or expeditionary force, was composed of 6 divisions, each of 3 infantry brigades of 4 battalions; 2 companies of mounted infantry; 2 field companies of engineers; 1 telegraph company; 1 transport and supply column; 3 field ambulances. Besides these there are 4 cavalry brigades, and also army troops, consisting of air squadrons, wireless, balloon, signalling, and other companies.

On mobilisation this force was raised to a total of 166,000 men by the addition of the reserve and the new special reserve. (See the articles MILITIA, RESERVE.) The question of the reserve and the provision of an expansive power for the regular

army outside its own limits was still in 1907 as in 1870 the crucial point of the army problem. Without the regular reserves not a single regular battalion sent from home could have taken the field in South Africa. But even for a short campaign some further draft-producing organisation was required. The militia as then constituted could not be compelled to serve abroad, and, further, was deficient in strength and unorganised for war. In practice its depleted battalions were invited to serve, and bravely accepted the duty. It was essential to assign to it some more definite function, and, after full consideration of the alternatives, it was decided to transform it both in name and in fact into a true reserve. As the special reserve it is in time of peace a part of the army reserve, and in time of war an integral part of the first line, supplying to it both drafts to replace wastage, and in some cases battalions for reinforcement in the field. The guiding principle through out has been so to organise the military forces in time of peace that they can be rapidly and easily mobilised for war. The military history of the country exhibits a series of small wars, which cannot be reduced to any common denomination. The first line or expeditionary force is adapted to cope with them, or in its expanded form to wage war on a larger scale. The second line is filled by the Territorial Army, which represents the old yeomanry and volunteers. See VOLUNTEERS AND TERRITORIAL ARMY.

Recent developments of military policy have been no less striking in the sphere of imperial defence. The value of the services rendered to the mother-country by the Canadian and Australasian contingents during the South African war was gratefully recognised by all patriotic Britons, and called attention to an element of military power till then hardly realised by the empire. General plans of imperial defence have since then been under discussion at colonial congresses, and that of 1907 resulted in an agreement to organise the forces of the empire on a common basis. The labours of the Committee of Imperial Defence (q.v.) and of the General Staff advanced matters, and finally definite proposals were approved and ratified by the representatives of the overseas dominions at the Conference on Imperial Defence in 1909. The substance of the scheme is that the organisation, training, transport, and equipment of the available forces of the empire should be standardised, so as to become interchangeable. Each colony would provide troops for its local defence, but at the same time be prepared to give aid elsewhere on prearranged lines. Thus, while local autonomy was preserved, the various forces might, at need, be rapidly combined into a homogeneous imperial army. If to 7 divisions of regulars and 14 of Territorial Force at home, there were added the 9 of Indian, and a future 16 from the dominions and colonies, there would be a grand total of 46 divisions. The British army in France in the last year of the Great War stood at over 70 divisions. A unifying element was looked for in the General Staff (q.v.), which soon acquired an imperial character by the interchange of officers with colonial military staffs, all actively engaged in the study of imperial strategy and the formulation of war plans. It remained to create and organise the component forces, so that they could be readily concentrated anywhere. Meanwhile it is satisfactory to note an increasing tendency to keep the military problems of imperial defence outside the range of party warfare.

The cavalry was not included in the Cardwell reorganisation, but kept in single independent regiments. In 1893 it was divided into three corps — Dragoons, Lancers, and Hussars, with recruiting for each corps in general, and a draft-finding depot at Canterbury. In 1904 the Cardwell principle was applied, and 14 regiments abroad were linked with 14 regiments at home, which were given the duty of supplying drafts. In 1910 six new depôts were established, one in each command, to serve as mobilisation centres, and in time of war to produce reserve regiments and to train drafts. The South African war demonstrated the military value of mounted infantry. Every regular unit had a proportion of men who had been through a course of mounted infantry training, and in South Africa a staff was maintained as part of the garrison. But it is doubtful whether in future there will be any such. Yeomanry do the same work, and all cavalry are trained in dismounted combat. Yeomanry are not armed with the sword. It is estimated that on mobilisation about 150,000 horses would be required for military purposes. Steps were taken to institute an annual census of horses, and to organise machinery for their collection through the county associations. In the new method of training our cavalry, great importance is attached to scouting and reconnoitring, shooting, and fighting on foot. The weight carried by the horse was reduced, and, in opposition to the opinion of many cavalry officers, the lance was in many cases abolished.

The Indian army consists of Indian regular forces, the Hyderabad contingent, the Central India Horse, local corps, British volunteers, Indian army reservists, imperial service troops, and military police. The local corps are really police under military supervision, while the military police are under civil control. The imperial service troops are trained for service by certain feudatory chiefs under the superintendence of British officers. In the five years preceding 1909 a complete reorganisation of the Indian army was successfully carried out under the direction of Lord Kitchener, the commander-in-chief. The old presidential nomenclature was abolished, the regiments and units were renumbered, and a divisional organisation was introduced. On mobilisation India can now place in the field a force of 9 infantry divisions and 8 cavalry brigades, all complete with the necessary staff supply and transport. The troops are divided into two armies, a northern and a southern, numbering about 130,000 and 106,000 respectively, and they have been localised in large masses on the lines of railway: the artillery has been rearmed with quick-firing guns; and a staff college has been established at Quetta on the model of that at Camberley. The strength of our available military force in India before the Great War was:

British Regular Troops	75,250
Indian Regular Forces	158,000
British Volunteers	34,000
Indian Army Reservists	22,000
Imperial Service Troops	20,000
Local Corps	5,250
Military Police	28,340
	342,840

The spirit of reorganisation communicated itself from the mother-country to the overseas dominions, and they were soon largely engaged in increasing their military strength and adapting it to imperial needs on the lines laid down by agreement with the General Staff. The Great War effectually drew them out of the stage of transition. Canada soon had a permanent force of regulars who act as instructors, with an establishment of 5000 and a strength of over 3000. There is also an Active Militia and a Reserve Militia. By the act of 1904 all males between the ages of 18 and 60 are liable for service in the Active Militia. It was composed of 3100 mounted troops, 2000 artillery, and 35,000 infantry, or an approximate total peace strength of 3000 officers and 41,000 men. On mobilisation it was expected to reach a total of 100,000. A royal mili-

tary college has been established at Kingston. The Australian Commonwealth had a permanent force of about 1300, and citizen forces of 15,500 militia and 5000 volunteers. The troops were also divided into the Garrison Force and the Field Force. There were in addition some 43,000 members of rifle clubs and 18,600 cadets. A Defence Bill enforcing compulsory service was reshaped, so as to secure general acceptance, but the existing acts of 1903–4 already imposed a liability to serve in time of war on all between 18 and 60; yet Australia rejected compulsion during the Great War. The number of males between those ages was 1,161,000. It is proposed to organise the forces so that they may be capable of easy expansion. A military college has been established at Sydney. New Zealand had a force of approximately 20,000, out of a white population of less than one million. The Defence Act of 1908 authorises the raising of a militia for all males between the ages of 17 and 55. This might be used to create a force of at least 150,000. In South Africa, apart from the British garrison of 11,493, there were the following available troops: Cape, 611 Mounted Rifles, 5466 volunteers, 1265 Mounted Police; Natal, 2739 militia, 1006 Mounted Police, 6567 members of rifle associations, 3487 cadets; Transvaal, 10,000 volunteers, 4000 cadets. All of these forces overseas proved their power of expansion by huge increases during the Great War. There are also various permanent forces maintained at particular stations, the provision for which is voted by the Imperial Parliament. Malta has a garrison, which includes the local Royal Malta Artillery. There are two battalions of Royal Artillery, distributed as local companies at Ceylon, Mauritius, Hong-kong, and Singapore. The West Indian Regiment was disbanded in 1926, and the West African Regiment in 1928.

Since the Egyptian troubles of 1882, there had been an English army of occupation of over 4000. The numbers had usually been 6037 of all ranks, and to their upkeep the government of Egypt made an annual contribution of £150,000. The native Egyptian army, though officered in the senior ranks by English officers, was totally distinct, and in 1882 was entirely reorganised under a British general, as Sirdar. The extraordinary success of this reorganisation was shown by the series of brilliant campaigns, ending in the reconquest of the Sudan and the death of Mahdism. It took no part in the fighting of the Great War.

There has been a constant endeavour in recent years to improve the food, clothing, housing, and general conditions of the soldier's life, so as to bring them more into conformity with modern economic standards. It is satisfactory to note that the progress has been moral as well as material. Crime in the ranks tends to decrease, and the average stamp of recruit is undoubtedly of a higher type. Since 1906 enlistment has been for an elastic period—in the case of infantry of the line usually for 7 years, and part of an eighth if the man is serving abroad. Gratuities are granted to those leaving the colours, and after 21 years' service a pension may be obtained. The problem of the time-expired soldier has also received much attention. Under a short-service system the army is for many only a temporary career, to be followed by a return to civil employment. Their prospects have been greatly improved by various recent measures, such as the institution of a system of trade-training with the colours and the keeping of registers of civil employment at all district headquarters. Certain occupations in the post-office, police force, and other departments are expressly reserved for them, and valuable work is also performed by various private agencies and institutes. It was arranged to allot to the county associations important duties in connection with the care of reservists and discharged soldiers.

The great distinction between the British army and that of nearly every other state in Europe is that the service is voluntary. The subjects of the crown engage by free choice to serve in the army and reserve. The only form of compulsory service —and that is in abeyance—is the ballot for service in the militia; this, though still on the statute-book, has not been enforced since 1831.

The number of men provided for has varied considerably in recent years. The average strength of the regular army at home and abroad was 209,221 in 1890, 220,309 in 1895, rose to 450,000 in 1901–2 during the South African war, and dropped to 235,761 in 1903–4. The establishment of the regular army for 1910–11 was 255,438. Of this number 184,200 were serving at home, 45,215 in the Colonies and Egypt, and 75,884 in India. The composition of the home forces was as follows:

Cavalry	14,762
Horse and Field Artillery	19,185
Garrison Artillery	13,696
Engineers	9,610
Infantry	96,182
Army Service Corps	6,696
Army Medical Corps	4,637
Colonial and Native Indian Corps	8,580
Departmental Corps	3,465
Additional	1,850
Permanent Staffs, &c.	2,937
Staffs and Departments	1,152
Miscellaneous	1,448
	184,200

The strength of the Special Reserve in March 1910 was 69,341, and of the Territorial Force 276,618, of all ranks. All categories increased greatly during the Great War, the total rising to over 5 millions. On peace arriving, steps were taken for reduction to the pre-war figure.

Foreign Armies.—Nations have tried at various times a number of experiments in the kind of armies they support, as distinguished from the strength of them. Roughly speaking, there are three different kinds, which may be, however, and often are, found in combination in a single country. There is, first, the regular or standing army, composed either entirely of men who make the army a life career, or of men who enlist for a spell with the colours, followed by service in a reserve. Here every man becomes a fully trained soldier before leaving the colours. The second type may be called the militia system, under which a man does only a short continuous training, and is called up at intervals for a few weeks of camp. The third type corresponds to British territorials, who have no first spell of continuous training, but do throughout the year a fixed number of drills. Herewith are given a few facts and statistics of the armies of foreign nations before the Great War, further details being given in relevant sections of the articles on the several countries.

Germany. —By the imperial constitution of 1871, the Prussian obligation to serve in the army was extended to the whole empire. The service in the standing army was 7 years, 3 with the colours in the cavalry or horse artillery, and 2 in all the other branches, and the remainder with the active reserve. After quitting the active reserve, the soldier passed 5 years in the landwehr and 7 in the reserve, remaining till his 39th year in its second levy, and concluding with 6 years in the landsturm. 'One-year volunteers' were passed into the reserve at the end of their first year, on condition of passing certain examinations, and bearing the expense of their clothing, equipment, &c. for the year. In the German organisation the territorial system was carried out thoroughly. The army consisted in

1914 of 26 'first-line' army corps, and comprised a peace strength of nearly 800,000 rank and file, exclusive of one-year volunteers and extra-recruits. The corps districts were divided into divisional and brigade districts, which were again subdivided into landwehr battalion districts, and these in turn into company districts, so that every village had its definite place. Each line regiment (3 battalions) drew its recruits from an allotted district, and passed its time-expired men into the landwehr regiment (2 battalions) of the same district. After the exemptions common to all countries had been granted, the ballot allowed a margin of about 10 per cent., those who drew the fortunate numbers passing at once into the Ersatz reserve, which received no training in peace-time, but would be called on to replace casualties in the field. The military strength upon mobilisation was estimated at a total of 4,200,000 trained men.

France.—A law passed in 1872 enacted that every Frenchman, with a few specified exceptions, unless serving in the navy, was liable to personal service in the army, and forbade substitution. The period of liability under a law of 1905 extends to 2 years in the active army, increased to 3 years in 1912; 11 years in the reserve of the active army; 6 years in the territorial army; and 6 years in the reserve of the territorial army. In 1909 the effectives with the colours were estimated at 22,000 officers and about 600,000 men. The forces were organised into 21 army corps in 1912, exclusive of the Paris and Tunis garrisons. The infantry of the active army consisted of about 376,000 men, the cavalry of 67,300, and the artillery (which was reorganised in 1912) of 98,500; the other arms numbered about 60,000. It is estimated that the French army, with its various reserve and territorial forces, included 3,500,000 men on a war footing, and that 4,000,000 untrained men might be embodied, all of whom were needed in the Great War. The French colonial army comprised 6 brigades of infantry, 12 batteries of field artillery, 6 mountain batteries, and 12 garrison batteries. There were also forces in Madagascar, W. Africa, and Martinique, and in Indo-China some 34,000 infantry.

Austria.—The military forces of the Austro-Hungarian monarchy were divided into the standing army, the landwehr, and the landsturm. All subjects were liable to service, and those exempted on physical grounds paid a fine proportionate to their means. In principle every qualified man throughout the monarchy was liable from his nineteenth year, and must serve 3 years with the colours, 7 in the reserve, 2 in the reserve of the landwehr, and then till his 42d birthday in the landsturm, from which, in time of war, men might be drafted into the landwehr; men who had passed through the regular army were liable for service in the landsturm as officers or non-commissioned officers till the age of sixty. In practice, however, financial considerations caused the division of recruits into three classes: about 95,000 annually formed the first class, trained as above; nearly 10,000 were drawn to supply the Ersatz reserve; and all the remainder passed at once into the landwehr, there to serve their twelve years. The standing army was under the control of the Minister of War for the monarchy, while the landwehr was controlled by the Austrian and Hungarian Ministers of National Defence. This common or active army comprised 468 battalions of infantry, 252 squadrons of cavalry, and proportionate artillery, which was frequently increased. It was organised in 16 army corps, with 6 cavalry divisions and 34 infantry divisions, to each of which was attached a corresponding landwehr division. The peace strength was 472,000 officers and men, and the war strength about 4,320,000.

Russia.—Universal liability to service was first established in 1870, but, although prohibited, the purchase of exemption was commonly permitted. The period of service was 4 years in the active army (one on furlough), 14 years in the reserve, and 5 in the Opoltschenie or militia. The Russian military forces were composed of regular and irregular troops, and militia, only called out to repel invasion. Every man not included in the army or reserve belonged to the militia up to his 43d year. The country was divided into 13 military districts, with sub-districts and 'circles,' as in Germany. The irregular troops were supplied by the Cossacks, who gave military service in lieu of taxes, and comprised about 150,000 men, chiefly cavalry. There were 29 army corps in Europe, 3 in the Caucasus, 2 in Turkestan, and 5 in Siberia. The peace strength was about 1,300,000. At the outbreak of the Great War in 1914, the war strength of the Russian active army was about 67,800 officers and 3,426,000 men. The total war strength was estimated at nearly 6,000,000.

Italy.—The Sardinian law of conscription forms the basis of the Italian military system, and all are liable from 20 to 40. Substitution is allowed in the case of brothers, and one-year volunteers are accepted. Contingents were divided by lot into three classes, one going to the permanent army, a second enjoying unlimited furlough, and the third passing to the militia. In practice the soldier passed 2 years in the ranks, then 6 in the reserve on furlough, 4 years in the mobile militia, and 7 in the territorial militia. There were 12 army corps, and under the reorganisation of 1909 there should be 344 battalions of infantry, 145 squadrons of cavalry, and 24 regiments of field artillery. The war strength of the forces was given as over 3 millions, with some three-quarters of a million in first line, but all outside the latter were little trained or not at all.

United States.—At the commencement of 1861 the United States army consisted of only about 14,000 regular troops. In various successive levies by the president during the civil war (1861–65), as many as 2,653,062 men had been called out —nearly one-fourth of the entire population of the Northern States. After the war the standing army was steadily diminished; a law passed in June 1874 provided that the army at no time might exceed 25,000 enlisted men. During the war with Spain, however, 219,035 volunteers were enrolled, and the regular army aggregated 55,682; total, 274,717. And by the Reorganisation Bill of 1901, the maximum enlisted force was increased to 100,000 men. The authorised establishment, being fixed at 100,000, was reduced to 80,000 for 1910. The organised militia was contributed by the various states, and was then in a state of transition; by a law of 1908 it was reconstituted on the lines of the regular army and made liable for service abroad. When the United States entered the Great War it adopted conscription, and had at once a possible of 14 millions of recruits. These were called up a million at a time, and when fairly trained were shipped to Europe at the rate of 30,000 a week in British ships.

Japan.—The military development of Japan falls into three periods—the feudal, from which she emerged in 1873; the period of foreign tutelage, which ended with the China-Japanese war of 1894; and the present, in which she possesses an effective and mobile modern army, admirably equipped from her own arsenals and manufacturing establishments. The army, which was victorious over Russia in 1904, had been organised on the German model, with the aid of highly skilled German officers, and was largely increased. Service is compulsory on all males between the ages of 17 and 40, but actual service does not begin till 20. Each man serves 3 years (2 for infantry) with the colours out of a total of $7\frac{1}{3}$ passed in the standing army and its

reserve, followed by 10 years in the second reserve and 2⅔ years in the territorial army. The establishment of the standing army was raised to 600,000, with total war strength nearly 2 millions.

China.—Under a progressive scheme of reorganisation, instituted in 1905, the Chinese military forces were acquiring consistency and unity. There were to be a first line and reserves, and ultimately it was proposed to create 37 divisions of all arms, with a strength of 28,000 officers and 430,000 men. Service was voluntary, and training was conducted by Japanese officers; but political disturbances, amounting to civil war, ruined national organisations.

Of the other military powers of the world the following were the conditions of service and the approximate strength in 1909:

Belgium, voluntary—peace establishment 43,000, but strength much less; war 169,000.

Denmark, national militia—peace 13,830; war stated to be 120,000.

Greece, compulsory service from 19 to 55—peace 30,000; war 70,000, intended ultimately to be 200,000.

Netherlands, militia, part voluntary, part compulsory, under new military system—peace 64,000; war 157,000; army of Dutch East Indies 40,000.

Norway, national militia, compulsory from 18 to 50—peace 30,000; war, nominal, 150,000.

Portugal, conscription—peace 31,000; war 250,000.

Spain, conscription, reorganisation of 1907—effective of 80,000, and total armed strength of 500,000.

Sweden, militia, part voluntary, part compulsory, under scheme of reorganisation begun in 1901—peace 64,000; war 450,000, rising to 600,000 in 1914.

Switzerland, national militia, universal and compulsory from 17 to 48—205,000 and 300,000 landsturm.

Turkey, being reorganised under the direction of German officers, probable strength nearly 1,000,000.

Bulgaria, universal and compulsory from 18 to 46—peace 58,000; war 400,000, out of a population of 4,500,000.

Montenegro, tribal militia, nominal war strength 50,000.

Rumania, universal and compulsory from 21 to 46—peace 90,000; war stated as 550,000.

Serbia, universal and compulsory from 18 to 50—peace average 25,000; war, potential, 300,000.

Argentine Republic, war 250,000.

Brazil, peace 30,000; war 50,000.

Chile, 94,000.

Mexico, nominal war strength 84,500, to be increased to 250,000.

Persia, after the Great War, a small growing regular army under British officers, and a cavalry and infantry militia.

Siam, universal training, standing force 6000.

ARMY ADMINISTRATION.—The whole of the operations connected with the raising, clothing, paying, maintaining, and controlling of an army are included in the term army administration. The sovereign has the supreme command of the British army, and controls it in every way through the Secretary of State for War, who is responsible to parliament for his own acts and for the advice he gives. This Secretary is the head of the War Office (see WAR), and is assisted by two under-secretaries, one permanent, the other parliamentary, but sitting in a different House from his chief. The sovereign's orders affecting organisation, entry into and retirement from the service, promotion, alterations in conditions of service, or, in fine, any fundamental matter of agreement between the sovereign and the soldier, are communicated by 'Royal Warrants' signed by the Permanent Under-secretary for War, and published when necessary. These warrants are previously published in the 'Army Circulars,' a monthly issue of orders (signed by the same functionary) dealing with minute details of allowances, supplies, arms and stores of all kinds—in fact, any expenditure of money or material. Army Circulars are supplementary to the 'Revised Army Regulations,' and are incorporated in those books when a new edition is published. Orders connected with the *personnel* of the army, and not involving expenditure, such as training, discipline, medals, rewards, special promotions, &c., are published in monthly pamphlets called 'Army Orders,' signed by the adjutant-general of the army. They are supplementary to the 'King's Regulations and Orders for the Army.' By the 'Army Regulations' and the 'King's Regulations,' everything connected with army administration is determined.

In 1895, on the retirement of the Duke of Cambridge from the post of commander-in-chief, a partial reorganisation of the War Office was carried through, by which the subordination of commander-in-chief (as well as of adjutant-general, quartermaster-general, director of artillery, and inspector of fortifications) to the Secretary of State was clearly defined. The War Office continued to be the medium through which the Secretary of State exercised his functions as administrator of the military system and minister responsible to the crown for the efficiency of the forces. Till 1904 he was advised principally by the commander-in-chief, who exercised general command over the military forces at home and abroad, issued army orders, held periodical inspections, and controlled the military department of the army. The commander-in-chief was assisted by the adjutant-general, the director-general of mobilisation and military intelligence, the military secretary, the quartermaster-general, and the inspector-general of fortifications, director-general of ordnance, and the director-general of the army medical department. The financial secretary reviews and supervises the expenditure generally, and advises the Secretary of State on questions of army expenditure.

A more fundamental reorganisation of the War Office was effected on the recommendations of a committee presided over by Lord Esher, which presented its report in three successive parts in January, February, and March 1905. Among the reforms insisted on were the immediate creation of an Army Council of seven members, with defined duties; the abolition of the office of commander-in-chief; the appointment of an Inspector-general of the Forces; and the strengthening of the already existing Committee of Defence. All the members of the new Army Council were appointed, and the office of commander-in-chief ceased to exist within fourteen days of the issue of the report. The prerogative powers of the crown, previously exercised by the Secretary of State and other principal officers, were now vested in the Army Council. The designation of the members and the distribution of duties is as follows: (*a*) Secretary of State (the minister responsible to the crown and parliament for all the business of the council); (*b*) 1st Military Member, the Chief of the Imperial General Staff, controls the General Staff (q.v.), directs military policy in all its branches, mobilisation, and operations of war, intelligence, training, manœuvres, and the higher education of officers; (*c*) 2d Military Member, the Adjutant-general, *personnel* (recruiting and discipline), rewards, peace regulations; (*d*) 3d Military Member, the Quartermaster-general, supplies, remounts, transport; (*e*) 4th Military Member, the Master-general of Ordnance, armament, fortifications, and ammunition; (*f*) Civil Member, the Parliamentary Under-secretary of State, civil business other than finance, and the Territorial Force; (*g*) Financial Member, the Financial Secretary, estimates, loans, expenditure, accounts and audit; (*h*) Surveyor-general of Supply,

contracts and the provision of stores in bulk; and two permanent secretaries. The Committee of Imperial Defence represents the previous Committee of Defence (originally a committee of the cabinet only), the Joint Naval and Military Defence Committee, and the Colonial Defence Committee, which it superseded in accordance with the recommendations made by Lord Esher and his colleagues. Its functions are advisory only, and it has no executive powers. A permanent nucleus is provided through the secretary, who is appointed for five years, and the two assistant-secretaries, who are appointed by the Admiralty and War Office for three years. Their duties are to consider all questions of imperial defence, from the point of view of the navy, the military forces, India, and the Colonies; to obtain and collate information from the Admiralty, War Office, India Office, Colonial Office, and other departments of state; to prepare any documents required by the Prime-minister and the Defence Committee, anticipating their needs as far as possible; to furnish such advice as the committee may ask for in regard to defence questions involving more than one department of state; and to keep adequate records for the use of the cabinet of the day and of its successors. By these means the government of the day is enabled to coordinate the work of the army and navy and to maintain a continuity of policy. The committee itself is a fluctuating body, but normally consists of the Prime-minister, 4 Secretaries of State, 1st Lord of the Admiralty, Chancellor of the Exchequer, 1st Sea Lord and Director of Naval Intelligence, Chief of Imperial General Staff and Director of Military Operations, together with other persons specially qualified to give assistance of a permanent or temporary nature according to the particular problems under discussion. The responsibility for policy rests with the Prime-minister. The committee holds frequent meetings, and in 1909 it held consultations with the representatives of the dominions who attended the Imperial Defence Conference. Lord Esher's committee further advised the appointment of an Inspector-general of the Forces. His duties consist of reviewing and reporting upon the practical results of the policy of the Army Council within the financial limits laid down by the cabinet. His field of action covers the whole United Kingdom and those portions of the empire where troops under the control of the home government are stationed. He must form a judgment, either personally or through his staff, on the efficiency of officers and men, on the handling of troops, on the standard and system of training, on the suitability of equipment, and generally on all that affects the readiness of the forces for war. Directly under him as part of his staff are inspectors of horse and field artillery, garrison artillery, engineers, and medical services, and a staff-officer for cavalry.

The business of the War Office is mainly conducted through a series of permanent committees and boards. In addition to the Army Council, which controls the general administration of the army, there is the Imperial General Staff, organised under orders of 1906 and 1909, with a central establishment at the War Office of 65 specially qualified officers, appointed for four years to study strategy, plan campaigns, collect intelligence, and thereby promote continuity of policy and uniformity of principles throughout the empire. The General Staff in commands and districts further assists in seeing that the prescribed policy is carried out and that military efficiency is secured. The Selection Board, composed of the military members of the Army Council, the Inspector-general, and four general officers commanding in chief, selects for commands and for special promotion. The Territorial Force is represented by an Advisory Council, with the Parliamentary Under-secretary as president and the Director-general of the Territorial Force as vice-president, and a number of specially qualified officers and other persons. Among other committees may be mentioned those on Aeronautics, Military Education, Mechanical Transport, Mobilisation, and Spiritual and Moral Welfare of the Army.

ARMY AGENT, a person appointed by government to receive the pay of army officers and to act as their banker. Regimental officers draw their pay monthly in advance, staff and departmental officers in arrear, from the agent, who receives it from government when due, and depends for remuneration on the officers' private banking business and the use of their pay for the month. Every regiment has an agent named in the *Army List*.

ARMY CORPS, a miniature army composed of all arms of the service, under the command of a field-marshal or general, and complete with every requisite appliance for war. The strength almost universally throughout Europe is from 30,000 to 40,000 men. After the South African war an organisation of the British army in army corps was partially effected, but Lord Esher's committee condemned the system, and it was finally abandoned in 1907 as unsuitable to the military needs of the empire.

ARMY DISCIPLINE is maintained by the administration of military law as consolidated in the Army Act of 1881, which incorporates the main provisions of the Mutiny Act (q.v.), and the Articles of War (q.v.), and is brought into force, and amended, if necessary, each year by the Army Annual Act. This last act also specifies the number of men to be maintained, and the price to be paid in billets during the ensuing year; it must be passed before the 30th April, on which date the previous act lapses. Military law is regulated by the Rules of Procedure and King's Regulations, and by it the soldier is governed in peace and in war, at all times and in all places. It provides for minor breaches of discipline by the power of summary punishment (with a maximum of twenty-eight days' detention) vested in every commanding officer, and for graver offences by the constitution of courts-martial with powers of sentence varying, according to the rank and number of the officers composing them, from forty-two days' imprisonment to penal servitude and death. The punishment of detention was introduced in 1906 to relieve soldiers guilty of minor offences from the stigma and military consequences of imprisonment. On the abolition of flogging, aggravated offences on active service were made subject to 'field punishment' in accordance with rules laid down, and the power to award this was later extended to all officers on active service. There is no appeal from the sentence of a commanding officer, but in most cases a soldier has the option of being tried by a court-martial. The sentence of a court-martial requires first to be confirmed by a prescribed authority. From it there is strictly no appeal, but it may be mitigated or remitted by His Majesty or an authorised officer.

ARMY ESTIMATES.—Early each year the War Office sends to the Treasury a series of accounts, setting forth the probable cost of everything required for the period from April 1 to March 31 following. These accounts are called the Army Estimates. In preparing them the Secretary of State for War applies to the heads of all the departments under him for detailed accounts of their probable requirements, submits them to the Treasury, and, if approved, to the House of Commons.

In the United States annual reports are forwarded by heads of departments to the Secretary of War, and are referred by the president to congress,

whose duty it is to examine the details of the estimate, and appropriate from the public funds the sum voted.

ARMY LIST, a list issued monthly, by authority of the War Office, of all commissioned and warrant officers of the British army, including the Royal Marines, the Indian army, the Special Reserve, Territorial Force, and Officers' Training Corps, whether on full or half pay; together with a list of the headquarters staff at the War Office, and of the staff of each general officer's command at home, in India, and in the Crown Colonies, and of the various educational, manufacturing, and other establishments, the members of Territorial Force county associations, and other information. A full index, an obituary, a list of the changes gazetted during the past month, and of the last issue of royal warrants, army circulars, and general orders, complete the work. A similar but larger volume is issued quarterly by the War Office, in which, besides the lists of each regiment, the officers of the army are also arranged on a seniority list, with the dates of their commissions and birth, and an account of their war services.

In the United States a similar annual publication, the *Official Army Register*, is issued by order of the Secretary of War, and includes a list of the officers, with notices of their services.

ARMY MEDICAL SERVICE.—In the British army, lieutenant is the grade in which an officer enters the Royal Army Medical Corps on probation, becoming later a captain. After twelve years' service, three abroad, he becomes a major, and then lieutenant-colonel at twenty-five years' service, eight abroad; then in succession colonel and major-general. A captain or lieutenant would be attached to every regiment or battalion on active service, and majors would have charge of the field-hospitals and bearer-companies. In peace-time officers of the Royal Army Medical Corps are not as a rule attached to units, but have medical charge of several regiments, or of the district hospital. There are also dental surgeons — lieutenants, captains, and majors.

On active service, every battalion, battery, cavalry regiment, or other unit would have a medical officer from the Royal Army Medical Corps attached, assisted by a corporal and four privates from the same corps. The battalion itself provides 16 stretcher-bearers and a squad trained in sanitary duties to act as sanitary police. Other units have a similar proportionate organisation. In the field there would be a medical *personnel* of 384 of all ranks to each cavalry division, and 700 to each infantry division, but varying greatly with the nature of climate and campaign. The total strength for 1910–11 was 4637, increased thirtyfold in the Great War. The duties of medical officers include training stretcher-bearers and sanitary police, purifying the water-supply, and preventing disease. The collection and removal of the sick and wounded from the battlefield is carried out by field-ambulances, which both give first-aid and act as temporary hospitals. There are 3 to each division and 1 to each mounted brigade. The infantry field-ambulance has a *personnel* of 10 officers and 220 rank and file with drivers and transport, and provides for 150 patients. The link between the field-ambulances of a division and the hospitals at the base is provided by a special mobile unit, the clearing hospital, with a *personnel* of 85 and provision for 200 patients. Stationary hospitals along the routes of evacuation are furnished with 200 beds each, and general hospitals at the base with 520 beds. This department also includes convalescent depots, ambulance-trains, and hospital-ships. The Queen Alexandra Imperial Nursing Service has also been reorganised; it comprises a matron-in-chief, matrons, sisters, staff-nurses, and orderlies. The medical department of the Indian army is separately organised.

ARMY PAY DEPARTMENT.—This department was, on the recommendation of Lord Esher's committee, absorbed into a new Army Accounts Department. The financial secretary is its representative at the War Office, and is responsible for the preparation of the army estimates. In 1910 the department was divided, the audit duties being retransferred to the War Office, and an Army Pay Department being constituted for army pay services. The directing staff are classified as command accountants, group accountants, and accountants. The officers of the Army Pay Department retain their military rank and titles, and are classified as chief paymaster, staff paymasters, paymasters. The duties of the Accounts Department comprise the issue and pay of allowances, the receipt and disbursement of all money for military purposes, examination and audit of all military accounts, and advising the major-general in charge of administration (see STAFF) on all questions connected with finance. In each command there is an audit office under the immediate charge of the chief accountant, with three accountants as deputy, for district services, and as cashier respectively; and there are offices under accountants at convenient centres for regimental services. The regimental paymaster no longer exists.

ARMY SCHOOLS comprise only those for the school-tuition of soldiers and their children. Under MILITARY SCHOOLS will be found the Staff College, the School of Military Engineering at Chatham, the School of Musketry at Hythe, Garrison Classes, and the Royal Military College at Sandhurst; and under ARTILLERY, the Royal Military Academy, the Military College of Science, and the Department of Artillery Studies, all at Woolwich, with the School of Gunnery at Shoeburyness. Chelsea Hospital is an asylum for veterans, not a school of instruction. The Duke of York's Royal Military School (now at Dover), and the Queen Victoria School at Dunblane, are orphanages for soldiers' children, not necessarily involving a military career for them. The Royal Hibernian School was abolished in 1924. In 1920 the inspectors of army schools and soldiers of the Corps of Army Schoolmasters were transferred to the new Army Educational Corps. Appointments (from September 1923) are made by a Board of Selection, consisting of the Deputy Director of Staff Duties (Education), two members nominated by the Chief of the Imperial General Staff, and two by the President of the Board of Education. Candidates for commissioned rank are required to undergo a year's course at an army school of education, and obtain at the end of it a diploma in education. For this course (in general) they are selected after an interview from commissioned officers of not less than one year's service who hold a university honours degree, and from warrant officers of the Army Educational Corps who pass an examination. Candidates for non-commissioned rank may be serving soldiers holding a special army certificate, or civilians holding an equivalent certificate. They will be required to undergo a course of two terms at an army school of education; but certificated teachers and certain others are normally exempt. All appointments are subject to a year's probation.

Recruits are examined after enlisting, and are classified. All non-commissioned officers and men must attend school till they obtain a second-class certificate of education, without which they are not promoted to sergeant's rank; while a first-class certificate is required before a soldier can be recommended for a commission. Where there are no facilities for attending civilian schools, soldiers'

children are taught by members of the Army Educational Corps, and by army schoolmistresses.

The ROYAL ARMY SERVICE CORPS, which has under its care the transport and supply departments, will be found described in the article COMMISSARIAT.

The ROYAL ARMY ORDNANCE CORPS, under the Master-general of the Ordnance, is charged with the providing, care of, and issuing of all military stores, ammunition, clothing, telegraph, telephone, and wireless apparatus, and countless other field necessaries. The corps consists of a major-general, and four classes of subordinate officers, of whom there were about 120 before the Great War, in command of some 1600 warrant officers, non-commissioned officers, and rank and file, distributed in companies. In the war the corps increased about twenty times.

Amongst the numerous articles on military subjects in this work will be found :

Adjutant.	Cavalry.	Foreign Legion.	Promotion.
Aide-de-camp.	Chaplain.	Fortification.	Quarter-master.
Ambulance.	Colonel.	General.	Rank.
Arsenal.	Column.	Guards.	Regiment.
Articles of War.	Commander-in-chief.	Gunnery.	Reserves.
Artillery.	Commissariat.	Gunpowder.	Rifle.
Barracks.	Commissions.	Kriegspiel.	Sentinel.
Bâtman.	Company.	Lieutenant.	Siege.
Battalion.	Court-martial.	Machine Gun.	Spy.
Battery.	Crimean War.	Marines.	Staff.
Battle.	Desertion.	Martial Law.	Strategy.
Bayonet.	Discharge.	Mercenaries.	Tactics.
Bearer Subdivi-sion.	Division.	Military Schools.	Torpedo.
Billeting.	Dragoon.	Militia.	Troop.
Brigade.	Engineers.	Mobilisation.	Uniform.
Bullet.	Enlistment.	Mutiny Act.	Volunteers.
Camp.	Firearms.	Peninsular War.	War.
Cannon.	Foreign Enlist-ment.	Pensions.	Waterloo.
Captain.		Pontoon.	Yeomanry.
Cartridge.			

Army-worm, a name applied to the larvæ of a small fly (*Sciara militaris*) occurring in northern Europe and in the United States. The maggots collect in millions, in bands many feet in length, six inches or so in breadth. The name is also applied to the caterpillars of *Leucania unipuncata*, which do great harm to grass and corn in the United States, and migrate in great bands in search of food and for other reasons.

Arnaboldi, ALESSANDRO (1827–98), Italian lyric poet, born at Milan, studied law at Pavia, and was till 1873 an official of the commune of Milan. Thereafter he lived in retirement in the neighbourhood, and gave himself up to literature. By his first collection of *Versi* (1872) he at once gained the reputation of a great poet, but failed to retain it. He published also *Nuovi Versi* (1888).

Arnal, ÉTIENNE (1794–1872), French actor, born at Meulan (Seine-et-Oise), was a soldier and button-maker before he took to the stage. Unsuccessful in tragedy, he made his name in comic parts, and acted near half-a-century in the Vaudeville and other Paris theatres. He published some verse.

Arnaldus Villanovanus, or DE VILLA NOVA, an alchemist, physician, and astrologer, probably of Spanish origin, may have been born about 1235. He lived in Aragon, Paris, and Sicily, and died in 1313 on his way to Avignon to treat Clement IV., who had sent for him. He wrote on medicine, alchemy, and religion, and was suspected of heresy.

Arnason, JÓN (1819–88), 'the Grimm of Iceland,' born at Reykjavik, was long national librarian. His great collection of Icelandic legends (1862–64) has been translated by Powell and Magnusson (1864–66).

Arnau, a town of Bohemia, on the Elbe, 17 miles NE. of Gitschin, has an interesting old rathaus and textile, metal, and paper industries; pop. 4000.

Arnaud, ARSÈNE. See CLARETIE (JULES).

Arnaud, FRANÇOIS THOMAS MARIE DE BACULARD D', French writer, was born in Paris, 15th September 1718. He early attracted Voltaire's attention. In 1748–50 he corresponded with Frederick the Great, who called him to Berlin in 1750, designated him Voltaire's successor, and otherwise showed such favour as to excite the jealousy and active hostility of Voltaire. After some stay in Dresden, he returned to Paris in 1755. Besides tragedies and poems, he wrote a long series of romances which were admired by Rousseau, and were very popular in their time. His later life was spent in poverty. He was imprisoned during the Terror; and died in Paris, 9th November 1805.

Arnaud, HENRI (1641–1721), pastor and military leader of the Waldenses, wrote in exile at Schönberg his famous *Histoire de la Rentrée des Vaudois dans leurs Vallées* (1710).

Arnauld, ANTOINE (1560–1619), the greatest advocate of his time in France, won a wide celebrity by his zealous defence of the university of Paris against the Jesuits in 1594.—His eldest son, ROBERT ARNAULD D'ANDILLY (1588–1674), quitted the world for Port-Royal des Champs, and published translations of Josephus, Augustine, and St Teresa.—The advocate's twentieth son, ANTOINE (1612–94), 'the great Arnauld,' studied at the Sorbonne, became doctor and priest, and, living mostly in seclusion, became famous for his brilliant controversial writings, mainly against the Jesuits and in defence of the Jansenists. He became the religious director of the nuns of Port-Royal des Champs, the convent of which his sister was abbess. Here he and his friends, Pascal (q.v.), Nicole, and other 'Port-Royalists' living near him, produced many books, including treatises on grammar, geometry, and logic. He also wrote in defence of transubstantiation and against Calvinism. Under Jesuit influence, the king issued an order for his arrest. Arnauld hid himself for some time, but finally withdrew to Brussels, where he died. His works were published in 45 vols. (1775–83).—His sister, MARIE-ANGÉLIQUE (1591–1661), was made abbess of Port-Royal at eleven, ultimately reformed the convent by her holy example and severe discipline, resigned, and returned to be prioress under her sister Agnes (1593–1671).—Their niece, la Mère ANGÉLIQUE (1624–84), the daughter of Robert, became a nun at Port-Royal, was successively subprioress and abbess; and during the persecution of the Port-Royalists, sustained by her heroic courage the spirits of the sisterhood and their friends. See books by F. Martin (1873) and A.K.H. (1905), and Sainte-Beuve's *Port-Royal* (4th ed. 6 vols. 1878).

Arnault, ANTOINE VINCENT (1766–1834), was born in Paris, suffered four years' exile as an Imperialist (1815–19), and died secretary of the Academy. A rigid classicist, he produced seven dramas—the best *Les Vénitiens* (1799), but all inferior to his *Fables et Poésies* (1812), and *Souvenirs d'un Sexagénaire* (1833).

Arnauts, a Turkish name for Albanians.

Arndt, ERNST MORITZ, German poet and patriot, was born in the then Swedish island of Rügen, 26th December 1769. The son of a former serf, he was trained with a view to the church at Stralsund, Greifswald, and Jena; but in 1805 he became professor of History at Greifswald. His history of serfdom in Pommern and Rügen (1803) led to its abolition; and in his *Geist der Zeit* (1807) he attacked Napoleon with such boldness that, after the battle of Jena, he had to take refuge in Stockholm. He was able to resume his functions at Greifswald in 1810; but he resigned the following year, in order to become an active co-operator with the minister Stein in stirring up the national feeling of Germany. His songs, poems, and fugitive writings, full of

energy and fire, contributed not a little to rouse and sustain the spirit of Germany before and during the war of liberation. His famous song, *Was ist des Deutschen Vaterland?* and many others, are sung wherever German is spoken. In 1817 he married a sister of Schleiermacher's, and in 1818 became professor of History in the new university of Bonn; but, aiming steadily at constitutional reforms, he was suspended in 1819 for participation in so-called 'demagogic movements,' and was not restored till 1840. He was elected a member of the German national assembly in 1848, but retired from it in 1849. He returned to Bonn, and continued in his fugitive writings to advocate the views of the German national party. Vigorous in mind and body, beloved and revered by the whole German people as 'Father Arndt,' he died at the age of ninety, 29th January 1860. His works comprise an account of the Shetland and Orkney Islands (1826); numerous political addresses to the German nation; some volumes of reminiscences; and his poems. See his letters edited by Langenberg (1878), and Meisner (1892), and Lives in German by Baur (new ed. 1882), Meinhold (1910), Müsebeck (1914).

Arndt, JOHANN, a German Lutheran divine, was born at Ballenstedt, Anhalt, in 1555, and died at Celle, Hanover, in 1621. His *Wahres Christenthum* ('True Christianity') was translated into most European languages, and is yet popular in Germany. Its object is edification—the promotion of practical religion; and it is written with great warmth and unction, and in a strain of piety bordering on mysticism. It has been called the Protestant *Imitatio*, and its author the Fénelon of the Protestant Church. There are two English translations—by Boehm (1720) and by Jaques (1815).

Arne, THOMAS AUGUSTINE, Doctor in Music, one of the best and most pleasing of English composers, was born in London, 12th March 1710, and received his early education at Eton. His father, who was an upholsterer, intended to educate him for the bar; but the love of music was too strong to be restrained. Young Arne became skilful as a violin-player, forming his style chiefly on the model of Corelli; and his zeal in the study of music induced his sister (afterwards the actress Mrs Cibber, 1714–66) to cultivate her excellent voice. He wrote for her a part in his first opera, *Rosamond*, which was first performed with great success in 1733. Next followed his comic operetta, *Tom Thumb, or the Opera of Operas;* and afterwards his *Comus* (1738), which displayed greater cultivation of style. He married a singer, Cecilia Young (1736); and after a successful visit to Ireland, was engaged as composer to Drury Lane Theatre, and wrote many vocal pieces for the Vauxhall concerts. The national air, *Rule Britannia*, which was originally given in a popular performance, *The Masque of Alfred*, was of his composition, as was also the well-known setting of *Where the Bee Sucks*, written for a performance of the *Tempest*. Besides music for many long-forgotten works, he composed two oratorios, the opera *Eliza*, and another, *Artaxerxes*, in the Italian style; but his genius was better adapted to simple pastoral melody than to great dramatic compositions. In later life he enjoyed considerable reputation as a music teacher, his most distinguished pupil being Miss Brent. He died in London, 5th March 1778. See CIBBER.

Arnee, the wild Buffalo (q.v.) of India.

Arnhem (anc. *Arenacum;* Ger. *Arnheim*), the capital of the Dutch province of Guelderland, on the right bank of the Rhine, 38 miles ESE. of Utrecht by rail. It manufactures tobacco, woollen and cotton goods, soap, beet-sugar, and paper. The environs are exceedingly picturesque, forming a favourite residence of merchants of the Low Countries. Among its most remarkable buildings are the 'great church,' with interesting monuments, and the town-hall, whose grotesque carvings have gained for it the name of 'Devil's house.' Sir Philip Sidney died in 1586 at Arnhem; in 1813 the town was taken by the Prussians. Pop. 75,000.

Arnhem Land, the peninsular northern projection of North Australia, so called from the ship of the Dutch navigators who discovered land here in 1618.

Arni. See BUFFALO.

Ar'nica, a genus of Tubulifloral Composites. The rhizome, leaves, and flowers of the Mountain Arnica (*A. montana*), sometimes called Mountain Tobacco, formerly enjoyed much repute in medicine as a stimulant in paralytic affections, low fevers, &c. The flowers are still employed to yield a tincture which is of service as an external application to wounds and bruises. The plant yields a considerable quantity of tannin, resin, volatile oil, and a peculiar alkaloid (arnicin). The rhizome is perennial and crooked, the stem about two feet high, simple or little branched, with few leaves, bearing on the summit a head of flowers of a dark golden yellow, often two inches in breadth. It flowers from June to August, forms an ornament of mountain meadows in Germany and Switzerland, and is found upon the Continent as far south as Portugal, and as far north as Lapland. There are a few American species.

Arnica.

Arnim, HARRY, GRAF VON (1824–81), representative of an ancient noble house in the Mark Brandenburg, in 1864–70 was Prussian ambassador at Rome, and supported the German bishops at the Vatican Council; but as German ambassador to France (1872–74) he fell into Prince Bismarck's disfavour, and on a charge of purloining state documents was sentenced to a year's imprisonment. He had already retired into exile, and died at Nice. His only son Henning (1856–1910) married Miss Beauchamp, born in Sydney, who became famous as authoress of *Elizabeth and her German Garden* (1898), *Elizabeth's Adventures in Rügen, Fräulein Schmidt and Mr Anstruther, The Caravaners* (1909), and other characteristic works. She married Earl Russell in 1916.

Arnim, LUDWIG ACHIM VON, born at Berlin in 1781, began his career as an imaginative author with *Hollins Liebeleben* (1802), with Clemens Brentano stirred up sympathy for interest in the old popular poetry, and by the publication of *Des Knaben Wunderhorn* (1808–19). In 1809 appeared *Der Wintergarten*, a collection of novels; in 1810, a romance, *Die Gräfin Dolores;* in 1811, *Halle und Jerusalem*, a humorous dramatic poem; and in 1817, *Die Kronenwächter*, an historical novel. He died in 1831.—His wife, BETTINA VON ARNIM, a sister of Clemens Brentano, was born in 1785 at Frankfort, and married him in 1811. The great event of her early life was her enthusiastic attach-

ment to Goethe, whom she first saw in 1807, he being then nearly sixty. The correspondence, published under the title of *Goethes Briefwechsel mit einem Kinde*, in 1835, and translated by Bettina into English, is mainly founded on fancy. Her later works were semi-political in character. She died at Berlin, 20th January 1859. See Löper, *Goethes Briefe an Bettina* (1879).

Ar'no, next to the Tiber the most considerable river of Central Italy, rises on Mount Falterona, an offset of the Apennines, at an elevation of 4444 feet above sea-level, and 25 miles N. of Arezzo. It flows 140 miles in a generally westward direction, till it falls into the sea, 11 miles below Pisa, where it once had its embouchure. At Florence it is 400 feet wide, but is fordable in summer; and so far, except in the summer, it is navigable for barges. The Italian poets speak of 'the golden Arno;' but, in truth, its waters have mostly the colour of *café-au-lait*. The Arno is noted for the rapid and destructive character of its inundations, the most memorable being those of 1537 and 1740.

Arnobius (1) the Elder, a teacher of rhetoric at Sicca, in Numidia, about 320 A.D. He became a Christian about 300, and died most probably in 327. He wrote, according to Hieronymus, to prove the sincerity of his faith to the bishop who was to baptise him, his seven books, *Adversus gentes*, in which he meets the objections brought against Christianity, but shows that his own theology was not free from Platonic-gnostic conceptions. His work has great value to the student of the religion of Rome from the materials it contains. The standard edition is that by Reifferscheid (1875). An English translation will be found in vol. xix. of the *Ante-Nicene Library*.—(2) Arnobius the Younger was a bishop in Gaul in the second half of the 5th century. He wrote a commentary on the Psalms, which is still extant, and which shows traces of semi-Pelagian heresy. It is reprinted in the 53d vol. of Migne's *Patrologia Latina*.

Arnold of Brescia, was a native of that town, and was distinguished by the success with which he contended against the corruptions of the clergy in the early part of the 12th century. He was educated in France under Abelard, and adopted the monastic life. By his preaching, the people of Brescia were exasperated against their bishop, and through him Arnold was cited before the second Lateran Council, and banished from Italy (1139). He retired to France, but experienced the bitter hostility of St Bernard, Abelard's opponent, who denounced him as an enemy of the church. He thereupon took refuge in Zurich, where he remained five years. Meanwhile, an insurrection against the papal government had taken place in Rome, and thither in 1143 Arnold repaired, and endeavoured to lead and direct the movement. He exhorted the people to organise a government similar to the ancient Roman republic, with consuls, tribunes, and equestrian order; but they were disunited and restless, and gave way to the grossest excesses. The city, indeed, continued for ten years in a state of agitation and disorder; but these violent struggles were subdued by Pope Adrian IV. (Nicholas Breakspear), who, feeling the weakness of his temporal authority, turned to the spiritual, and resorted to the extreme measure of laying the city under an interdict, when Arnold, whose party became discouraged and fell to pieces, took refuge with certain influential friends in Campania. On the arrival of the Emperor Frederick Barbarossa for his coronation, in 1155, Arnold was arrested, brought to Rome, and hanged, his body burned, and the ashes thrown into the Tiber. But his influence lived after him, and through his sympathetic insight into his country's needs, his name is even yet revered and loved in Italy, though he left no record of his doctrines save in the heart of the people. His eloquence and disinterestedness are acknowledged even by his enemies, who are also his biographers, and who have yet placed him in history alongside Rienzi and Savonarola. His life is the subject of tragedies by Bodmer and by Nicolini.

Arnold of Winkelried. See Sempach.

Arnold, Benedict, a talented American military officer, whose early brilliant exploits are obscured by his attempt to betray his native country, was sprung from Rhode Island stock, and born in Norwich, Connecticut, 14th January 1741. By nature reckless and fond of adventure, he ran away from home when fifteen years of age, and joined the provincial troops then engaged in the old French war, but soon deserted. At twenty-one he became a merchant in New Haven. On the breaking out of the Revolutionary war, he joined the colonial forces; accompanied an expedition of 'Green Mountain Boys' (Vermonters), which, under Ethan Allen, captured Fort Ticonderoga; and in 1775, led an isolated detachment of an invading army through the wilds of Maine to Quebec, in the unsuccessful siege of which city he bore an important part. Here he was severely wounded, and for gallant conduct was made a brigadier-general by the colonial congress. Retreating from Canada by way of Lake Champlain, he superintended the construction on its waters of a flotilla, which he handled with much skill at the battle of Valcour Island.

Arnold was of an imperious and violent temper, and was frequently in difficulties with his fellow-officers; and, though greatly admired by General Washington and others high in rank, he appears to have had bitter and influential enemies. In 1777 five of his inferiors in rank were promoted by congress over his head to be major-generals—a circumstance which may be presumed to have sown the seeds of his subsequent disaffection towards the colonial cause. Though greatly chagrined, he was induced by Washington to retain his connection with the army; and, when on leave of absence he heard of the invasion of Connecticut by Governor Tryon, he hastened to join the colonial forces, and was present at the battle of Ridgefield, where his horse was killed under him. For gallantry in this action, he was made a major-general.

In the same year Arnold was sent by Washington to aid in the military operations in eastern New York, and fought with his customary impetuosity in the battles of Saratoga (having his horse killed, and being himself severely wounded), and is credited with having contributed largely by his skill and bravery to the capture of the invading army under General Burgoyne. Disabled temporarily by his wound, he spent much of the winter of 1777–78 in the hospital at Albany, and on the retirement of the royal forces from Philadelphia in the following spring, he was placed in command of that city. Here he met and married the accomplished daughter of Mr Edward Shippen, at whose house the unfortunate Major André (q.v.) had been a welcome guest during Howe's occupation of the city; and through this marriage appears to have begun that fatal acquaintance which resulted in the death of André as a spy, and the disgraceful downfall of Arnold as a traitor.

In 1780 Arnold sought and obtained the command of West Point, on the Hudson River (one of the most important posts in the colonies), which, through a conspiracy with André, he agreed to betray into the hands of the British commander. On the capture of André, and the discovery of the plot, Arnold precipitately fled to the British lines, and was given a command in the royal army. In

1781 he led an expedition against his native state. Four of his sons served with distinction in the British army. After the war Arnold lived in England, and died disappointed and obscure in London, 14th June 1801.

There are Lives by Jared Sparks (1838), I. N. Arnold (1880), and C. B. Todd (1903); and see Trevelyan's *George III. and Charles Fox* (vol. i. 1912).

Arnold, Sir Edwin (1832–1904), the son of a Sussex magistrate, was a scholar of University College, Oxford, and won the Newdigate (1852) with a poem on *Belshazzar's Feast*, for a while was second master at Birmingham, and afterwards became principal of the Deccan College at Poona. Returning to England in 1861, he joined the staff of the *Daily Telegraph*, of which he became editor. He published a volume of poems in 1853, and as early as 1875, in the *Song of Songs of India*, was busy with his life-task of interpreting in English verse the life and thought of the East. His most important book is *The Light of Asia, or the Great Renunciation* (1879), a verse-rendering of the story of the life of Buddha. His statement of Indian philosophy has not been accepted by experts as impeccable, and his fluent and sometimes grandiose blank verse was by critics generally regarded as lacking in distinction; but the work attained great popularity. In *The Light of the World* (1891) he attempted, more audaciously and less successfully, to do for Jesus Christ's life and teaching what he had done for Buddha. Other works were *Pearls of the Faith; With Sa'adi in the Garden* (translations from the *Gulistan*); *The Tenth Muse, and other Poems; Potiphar's Wife; Adzuma, or the Japanese Wife* (a play); *The Voyage of Ithobal.* He was C.S.I. (1877) and K.C.I.E. (1888).

Arnold, Matthew, was born on December 24, 1822, at Laleham near Staines, where his father, Thomas Arnold, afterwards head-master of Rugby, then lived and took private pupils. He was sent to Winchester in 1836, but was in 1837 transferred to Rugby, where he won the school prize for English verse in 1840, the subject being 'Alaric at Rome.' In 1840 he went to Balliol College, Oxford, where he won the Newdigate prize in 1843 for a poem on Cromwell. In 1844 he took his degree, with only a second-class in Greats; but in spite of this comparative failure in the schools, in 1845 he was elected a fellow of Oriel College, a distinction only conferred on men of the highest promise. In 1847 he became private secretary to the Marquis of Lansdowne, a Whig statesman of great sagacity and influence, who was unofficially consulted by the queen on most matters of political importance. He had been for a short time a master at Rugby, when in 1851 Lord Lansdowne appointed him an inspector of schools, and in the same year he married a daughter of Mr Justice Wightman. He had in 1849 published a volume entitled *The Strayed Reveller and other Poems*, under the initial 'A.' Five hundred copies were printed, but the reception of the book was so discouraging that the remainder of the edition was withdrawn from publication. In 1852 appeared a second volume, *Empedocles on Etna*, also under the initial 'A.,' which was similarly withdrawn. In 1853 a volume of *Poems* appeared under his name, containing some of the suppressed poems, and also including 'Sohrab and Rustum,' a fragment of a romantic epic, the subject being an episode taken from Firdusi's *Shah-Nameh.* In 1855 a further volume of *Poems* (second series) appeared, including the epic poem of 'Balder Dead.' In 1857 Arnold was elected to the professorship of poetry at Oxford, and in 1858 published his tragedy of *Merope*, modelled on the traditions of the Greek drama. In 1867 he published his *New Poems*, which contained 'Thyrsis' and 'A Southern Night.' In 1869 two volumes of *Collected Poems* were published, 'Rugby Chapel' here appearing for the first time. Meanwhile he had been also publishing some of the prælections of his professorship—*Studies in Homeric Translation* in 1861 and 1862, *On the Study of Celtic Literature* in 1867; some important educational treatises, such as *The Popular Education of France* in 1861, *A French Eton* in 1864; as well as the famous volume of *Essays in Criticism* in 1865, *Culture and Anarchy* in 1869, and *Friendship's Garland* in 1871. He then began to interest himself in the question of popular religion, publishing in 1870 *St Paul and Protestantism*, in 1873 *Literature and Dogma*, in 1875 *God and the Bible.* Beside these volumes he published selections from Wordsworth and Byron, with introductions, and wrote introductions for selections from Gray and Keats in Ward's *English Poets.* He retired from his inspectorship after over thirty years' service, was awarded a government pension for his services to literature in 1883, and a few months later visited America to give lectures, which were admittedly ineffective, owing to his inaudible delivery. Before his American tour he had published *Mixed Essays* in 1879 and *Irish Essays* in 1882. In 1888 appeared a second series of *Essays in Criticism.* He died suddenly on April 15 in the same year, at Liverpool, of heart disease, and was buried at Laleham. In 1895 there appeared a collection of his *Letters*, which have little literary distinction, but serve to illustrate the simple and domestic nature of his temperament. Most of these letters were, however, written to members of his own family, and it is possible that they do not represent adequately his epistolary quality.

Matthew Arnold's work falls into four distinct sections—(1) his poems; (2) his literary and critical essays; (3) his studies in popular religion; (4) his educational writings—a volume of selected passages from his reports appeared in 1911.

(1) The poems of Matthew Arnold have a perfectly distinct quality of their own. They are deeply penetrated with Greek ideas and Greek methods of expression. His larger enterprises, such as *Merope*, 'Balder Dead,' and *Empedocles on Etna*, are the least effective. On the other hand, 'Sohrab and Rustum' is a most majestic fragment of Homeric epic, loaded with noble similes. But he had a great power of producing stately and beautiful elegiac poems, in which the passion of the past, touched with mournful regret, frames itself in lovely English backgrounds of the tilled and pastoral country which he loved the best. In his lyrics there is to be found a note of strictly suppressed passion, which emphasises a temperate control rather than a natural expansion of emotion. And there are many lyrics as well of exquisite freedom and colour, besides sonnets of gnomic weight and measured bareness. Taken altogether, the poems are not the work of a hopeful or impulsive mind. They are stern, reflective, sorrowful, regarding the world as a place full of beauty which it is impossible to enjoy lightheartedly, and as a scene of duty which it is unmanly to wish to avoid. Their most striking characteristics are refinement, economy of effect, stateliness, and nobility of a learned order. They are the work of a poet whose emotion is held serenely in check by a scholarly and philosophical instinct.

(2) It is perhaps as a literary critic that Matthew Arnold did the most marked service to his generation. He protested with all his might, trenchantly and ironically, against the besetting sin of the English mind in literature, which is a species of individualistic anarchy. The Englishman in literature has no respect for the expert; his heady theory of liberty makes him value private judgment above authority. Matthew Arnold's position was that a

critical tradition must at all costs be developed; that the critic's business was to acquaint himself with the best that has been thought and written, so as to discern the law of literary development, by virtue of which masterpieces establish and retain their hold upon the mind. This critical authority, if established, would prevent writers from weltering in lazy experiment, and would save the readers of literature both from base and mean preferences, as well as preserve them from being at the mercy of deft tricksters. His own taste in literature was more irresponsible than his creed, and his judgment both of established and contemporary writers was highly eclectic. He undervalued many great authors, and disliked them petulantly; he also expended much curious interpretation on little attractive figures of no great significance. But he did undoubtedly suggest to the literary circle of England the truth that expert tradition has an immense formative influence, and it may be plainly said that he did more to rehabilitate the office of the critic than any modern English writer.

(3) In his studies of popular religion Arnold had a great temporary effect in dispersing the mists of ecclesiastical dullness and pedantry, in making religious speculation respectable, and in doing something to break down antiquated popular theories of revelation and biblical authority. He induced a great many thoughtful people to look beneath a conventional orthodoxy, and to discern the progress of the religious spirit, through the emphatic Jewish ideal of righteousness, up to the infinitely more noble and tender principles of Christianity. He sent many men and women back to the Bible, not as a verbally inspired manual of faith, history, and morals, but as a great collection of inspiring rather than inspired writings, in which the dealings of God with man were passionately and fallibly presented. The books did not gain by the compassionate sort of condescension which characterised their expression. Their lambent irony, their almost painful kindness, irritated a certain sturdy type of orthodox believer. But it was a fine crusade against that human tendency to annex religion to conventional and respectable conservatism, and to convert the most protesting influence and the most regenerating force in the world into a tame and acquiescent optimism.

(4) Arnold's educational utterances are suggestive rather than profound. He was the first to enforce the need of organisation in secondary curricula, a problem which has still been left untackled, and with regard to which he made no practical proposals. But Matthew Arnold's whole theory of education was based upon literary culture, and takes no account of the expanding needs of scientific and technical training, still less of the psychological element which is tending to revolutionise the whole system of national education. His theory of education was that of a process, partly intellectual, partly emotional, in which the acquisition of information played a large part, and the root-idea of which was to subject the mind, under critical guidance, to the influence of the masterpieces of literature; it was this attitude which drew from a critic the well-known gibe about Matthew Arnold's belief in the marked preference of the Almighty for university men; and it is clear that his instinctively academical traditions blinded him to the wider tendencies which were making themselves felt in educational theory. It is almost startling to realise, from the volume of selections (1911) mentioned above, how ineffective and unfruitful his doctrines have proved to be, and the impracticability of reducing his ideal of culture to anything like a comprehensive system. Secondary education is even more chaotic at the present moment than it was in Matthew Arnold's day, because the curriculum has been flooded with new subjects, while co-ordination seems as far off as ever.

Matthew Arnold as a man was one of the most gracious and princely personalities. He was tall and impressive, and his motions and gestures had a bland and insinuating courtliness. His great head with its dark, rippled hair, his big features, his large, expressive mouth, framed in heavy side-whiskers, his gentle glance, made him a marked figure at any gathering. His nature was simple and affectionate, as his letters abundantly show; but this simplicity was often overlooked in face of his elaborate manner, his courteous deference, his mellifluous and *soigné* utterance. The popular impression of his attitude was brilliantly indicated by Mr W. H. Mallock in the *New Republic*, under the thinly veiled disguise of 'Mr Luke.' But all who knew him loved, trusted, and respected him to an extent which nothing but genuine affection and perfect loyalty could have earned. In a generation of notable figures, he was one of the most attractive and impressive. He threw his whole weight on the side of reasonableness, urbanity, persuasiveness, and sympathy; and it is remarkable that a writer whose favourite attitude was a cultivated irony should have given so little personal offence, and on the whole have been so little misunderstood.

It is understood that Matthew Arnold expressed a definite wish that his biography should not be written, but there are three small monographs dealing with his life and work, by Professor Saintsbury in the 'Modern English Writers' series (1899), by Mr H. W. Paul in the 'English Men of Letters' series (1902), and by Mr G. W. E. Russell in the 'Literary Lives' series (1904). Further biographical details can be obtained from *The Letters of Matthew Arnold*, from 1848 to 1888, edited by Mr G. W. E. Russell (1895, reprinted 1901), and from *Matthew Arnold's Notebooks*, with a preface by the Hon. Mrs Wodehouse (Matthew Arnold's daughter, Lady Sandhurst), 1902. *The Works of Matthew Arnold*, in 15 volumes (1904–5) includes his letters, and contains, in vol. iii., a complete bibliography. An article in the *Quarterly* in Jan. 1905, by Dr T. H. Warren, contains a survey of several of the above-mentioned books.

Arnold, SAMUEL (1740–1802), successively organist to the Chapels Royal (1783) and to Westminster Abbey (1793), produced operettas and oratorios, but is best remembered for his collection of cathedral music.

Arnold, THOMAS, head-master of Rugby, was born 13th June 1795, at East Cowes, in the Isle of Wight. In 1807 he went to Winchester, whence in 1811 he was elected a scholar of Corpus Christi College, Oxford. Having taken a first class in classics (1814), he was next year elected a fellow of Oriel, and he gained the chancellor's prizes for the Latin and English essays in 1815 and 1817. He took deacon's orders in 1818, and the year after settled at Laleham, near Staines, where he prepared pupils for the university. In 1820 he married Mary Penrose, daughter of a Nottinghamshire rector, and sister of one of his earliest friends; in August 1828 he entered on the task of regenerating Rugby, where he had the tact to make himself both loved and feared. His influence was felt in all the public schools of England, and he remains a noble type of a head-master. In 1832 he purchased for his vacations Fox How, between Rydal and Ambleside. A Whig and a Low Churchman, in 1841 he received from Lord Melbourne the Regius Professorship of Modern History at Oxford. He died suddenly of *angina pectoris*, 12th June 1842, and was buried in Rugby Chapel. His principal works are six volumes of Sermons (best ed. 1848); an edition of Thucydides (3 vols. 1830–35); the *History of Rome* (3 vols. 1838–43, broken off at the end of the second Punic war), in which he very closely followed Niebuhr in the theory that the early history was

largely fabulous and founded on the lays of minstrels; and his Oxford *Lectures on Modern History* (1842). 'These,' in the words of an *Edinburgh* reviewer, 'are all proofs of his ability and goodness. Yet the story of his life is worth them all.' And that story has been admirably told by Dean Stanley in his *Life of Arnold* (1845; often reissued, edited, and abridged, as in 1901 and 1910). See, too, works by Findlay (1897), Worboise (1897), Fitch (1897), and Whitridge (1928).

Arnold, THOMAS KERCHEVER (1800–53), born at Stamford and educated at Cambridge, was rector of Lyndon in Rutlandshire, edited school classics and a Latin lexicon, and produced manuals of Greek and Latin prose composition.

Arnot, WILLIAM (1806–75), Scottish preacher and author of religious works, was born at Scone, and was the popular minister of a Free church, first in Glasgow and then in Edinburgh. See his *Autobiography and Memoir* (1877).

Arnott, NEIL (1788–1874), born at Arbroath, the son of a Catholic farmer, studied at Aberdeen and in London, where from 1811 till 1855 he carried on a medical practice. He wrote on physics, and invented the water-bed, a stove, and a ventilator.

Arnotto. See ANNATTO.

Arnsberg, a manufacturing town of Westphalia, on the Ruhr, 45 miles SE. of Münster, was a main seat of the famous Vehmgerichte (q.v.); pop. 10,000. Paper is the principal product.

Arnstadt, a town of Thuringia, on the Gera, 10 miles S. of Erfurt; pop. 20,000.

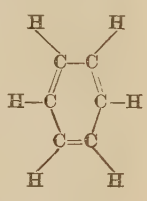
Arnswalde, a Prussian town, 41 miles SE. of Stettin, between three lakes, with manufactures of iron, machinery, matches, and woollens; pop. 10,000.

Aroideæ. See ARUM.

Ar'olsen, capital of the state of Waldeck, on the Aar; pop. 3000.

Aromatics constitute a class of medicines which owe their properties to the essential oils, to benzoic and cinnamic acids, to volatile products of distillation, or to odorous glandular secretions. The plants that contribute to this class of medicines are those which yield essences, camphor, or odorous resins, and amongst the families which yield the most important aromatics are the Labiatæ, Umbelliferæ, Lauraceæ, Myrtaceæ, Rutaceæ, Coniferæ, Zingiberaceæ, Orchideæ, &c. In some cases the aromatic matter is diffused throughout all parts of the plant, but it is usually condensed in particular organs, such as the root, in the case of ginger and galanga; or the bark, in the case of cinnamon, canella, and cascarilla; or the flowers, as in the case of cloves; or the fruit, as in the case of anise and vanilla; or the wood, as in the case of sandal-wood and aloes-wood; or the leaves, as in the case of most of the Labiatæ, Umbelliferæ, &c. They may be grouped thus: (1) those in which the active principle is an essential oil, as the oil of thyme, lavender, cajeput, neroli, fennel; (2) those containing camphor, or an allied body, such as artificial camphor obtained from turpentine; (3) bitter aromatics, in which there is a mixture of a bitter principle and an essential oil, as chamomile, tansy, wormwood; (4) those of which musk is the type, such as civet and ambergris, and certain plants with a musk-like odour; (5) those containing a fragrant resin, as benzoin, myrrh, olibanum, storax, and the balsams of Peru and Tolu, which possess stimulant properties; (6) those which are artificially produced by destructive distillation, as tar, creosote, benzol, or the various empyreumatic oils. They are mostly stimulants and antispasmodics; some act as vermifuges and tonics. See also PERFUMERY.

Aromatic Series. This term is applied to a large group of organic chemical compounds, many of which occur in balsams, essential oils, and other substances having an aromatic odour. It was originally limited to the compounds of the benzoic group, but it has now been extended so as to include other series homologous with them, and ranging round the group of hydrocarbons, C_nH_{2n-6}. The simplest of these hydrocarbons is Benzene (q.v.), in which there are six atoms of carbon, the formula being C_6H_6. Now, such a body is an unsaturated one (see ATOMIC THEORY), and is capable of uniting with monatomic elements such as chlorine to form chlorides, containing from one to six atoms of chlorine. To account for this, Kekulé has devised a structural formula for benzene, which assists one in understanding the complex relations of the aromatic series; but it must be borne in mind that such formulæ do not profess to represent the actual positions of the atoms in the compound, but are only used as convenient stand-points from which to regard them. In Kekulé's formula, the double lines, uniting the atoms of carbon, indicate that each of these atoms can still unite with an atom of hydrogen. From this peculiar construction, it is evident that the compounds of the aromatic series must have distinctive properties, and the number of these compounds be very large. Thus, referring to chlorine, we see that we may either *replace hydrogen by chlorine*, or add chlorine to benzene, the resulting bodies having the composition C_6Cl_6 and $C_6H_6Cl_6$, when the full amount of chlorine has been taken up. So also oxygen may enter into the compound, giving us a series of bodies called *phenols*, which are monatomic, diatomic, or tetratomic, according to the number of atoms introduced. The phenols correspond to the alcohols of the fatty series (see ALCOHOLS), ordinary phenol having the formula C_6H_5OH, that of common alcohol being C_2H_5OH. Hydrogen may also be replaced by amidogen, NH_2, giving rise to *Amines* (see ALKALOIDS), the best known of which is Phenylamine, or Aniline (q.v.), $C_6H_5NH_2$. The *nitro compounds*, in which hydrogen is replaced by the group NO_2, include nitrobenzene, or artificial oil of bitter almonds (not to be confounded with the true oil), the formula of which is $C_6H_5NO_2$. See NITRO-BENZENE.



When carbon enters the benzene group, C_6H_6, it forms many new compounds. Thus hydrogen may be replaced by radicals such as methyl and ethyl, CH_3 and C_2H_5, giving rise to such compounds as

Methyl benzene.....$C_6H_5CH_3$;
Ethyl benzene.....$C_6H_5C_2H_5$;

or, again, more than one molecule of these radicals may be introduced, as in

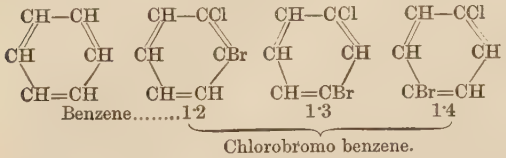
Dimethyl benzene.....$C_6H_4(CH_3)_2$;
Methyl-ethyl benzene.....$C_6H_4CH_3C_2H_5$.

From these again are derived aldehydes, alcohols, and acids, of which we can only give a single example:

Methyl benzene, or toluene..$C_6H_5CH_3$;
Benzyl alcohol.....$C_6H_5CH_2OH$;
Benzyl aldehyde.....C_6H_5COH;
Benzoic acid.....C_6H_5COOH.

All of which, in their composition and properties, show close analogies to the corresponding fatty compounds. An account of the aromatic series would be incomplete without reference to the *isomerism* which exists among its members. A reference to the formula for benzene will show that when only one atom of chlorine has been

introduced into the molecule, there can only be one monochlor benzene. When two, however, are present, or when one atom of chlorine and one of bromine have replaced hydrogen, as in chlorobromo benzene, the case is different:



Here we see that the atoms of hydrogen replaced may be either contiguous (1·2), separated by one group of CH (1·3), or by two groups (1·4); and that this is not a mere distinction on paper is borne out by experiment, which has succeeded in producing three chlorobromo benzenes, differing in properties, but identical in percentage composition. There are many other isomeric bodies known, but for further information the reader must refer to the article on ISOMERISM, or to a practical treatise on the subject.

Aromatic Vinegar differs from ordinary vinegar (which is acetic acid diluted with water) in containing certain essential oils which impart an agreeable fragrance. It is generally prepared by adding the oils of cloves, lavender, rosemary, bergamot, neroli, and cinnamon to the strongest acetic acid. Aromatic vinegar is a very pleasant and powerful perfume; it is very volatile, and when snuffed up by the nostrils, is a powerful excitant, and hence is serviceable in fainting, languor, headache, and nervous debility. Aromatic vinegar is generally placed on a sponge in a smelling-bottle or in a *vinaigrette;* it can also be purchased as a liquid in phials; and a drop or two allowed to evaporate into a sick-room, overpowers, but does not destroy any unpleasant odour. The liquid must, however, be cautiously dealt with, as it is very corrosive.

Aronia. See CRATÆGUS.

Aroo'stook, a river which, rising in the north of Maine, falls into the St John in New Brunswick, after a course of about 120 miles. It possesses an historical interest from its connection with the long-agitated question of the north-east boundary between British America and the United States.

Arouet, the family name of Voltaire (q.v.).

Arpad, the national hero of Hungary, under whom the Magyars first gained a footing in that country, about 884. Chosen duke on his father's death, he extended his conquests by incessant and mostly successful warfare with the Bulgarians, Wallachians, and Moravians, and made more than one successful incursion into Italy. He died in 907, leaving his power to his son. The Arpad dynasty ruled Hungary as dukes from 889 to 1000, and as kings from that year until it became extinct in the male line with Andreas III. in 1301. Arpad yet lives in the popular songs of the country, and not a little legend has gathered round his name.

Arpad, or ARPHAD, was the name of a city in Northern Syria, long dependent on Damascus, and usually associated in Scripture with Hama (q.v.). See ASSYRIA.

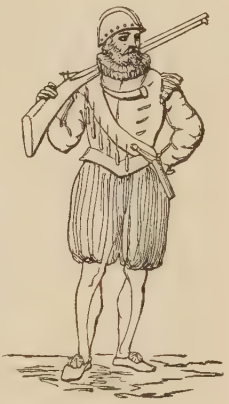
Arpeggio, a chord of which the notes are given, not simultaneously, but in rapid succession.

Arpent, an old French land-measure, corresponding to the English acre. It contained a hundred square perches, and varied with the varying value of the perch from about an acre and a quarter to about five-sixths of an acre; or, in modern French measure, from one-third to one-half of a hectare.

Arpi'no (anc. *Arpinum*), the birthplace of Cicero and Marius, stands perched on an eminence, midway between Rome and Naples, about 65 miles from each; pop. 10,000.

Ar'quà, an Italian village with about 1000 inhabitants, 12 miles SW. of Padua, in the heart of the Euganean Hills. Here Petrarch died July 18, 1374; his house may still be seen, and his monument of red marble in the churchyard.

Ar'quebus, or HARQUEBUS (from Dutch *haakbus*, lit. 'a gun with a hook'), was the first form of hand-gun which could fairly be compared with the modern musket. Those of earlier date were fired by applying a match by hand to the touch-hole; but about the time of the battle of Morat, in 1476, guns were used having a contrivance suggested by the trigger of the arbalest or cross-bow, by which the burning match could be applied with more quickness and certainty. Such a gun was the arquebus. Many improvements and changes were introduced in the weapon as time went on, one being a hooked form of butt to elevate the barrel and facilitate aiming. It is probable, however, that the 'hook' denoted in the name was a device on the barrel for attaching it to a tripod or other stand for steadiness in firing. *Arquebusiers,* soldiers armed with arquebuses, were common in 16th-century armies, the Spanish arquebusiers being of especial fame.—See the *N.E.D., s.v.* 'Harquebus'; also Pollard, *History of Firearms* (1926).


Arquebusier.

Arraca'cha (*Arracacha esculenta*), a plant of the natural order Umbelliferæ, a native of the elevated tablelands in the northern parts of South America. It is much cultivated in its native country for its roots, which are used as an esculent. When boiled, they are firm and tender, with a flavour not so strong as that of a parsnip. The plant is very like hemlock, to which genus Humboldt indeed referred it, and has a similar heavy smell. The flowers are in compound umbels, and are of a dull purple colour. The arracacha was at one time very strongly recommended as a substitute for potatoes; it was introduced into Britain through the exertions of the Horticultural Society, and its cultivation perseveringly attempted; but it has been found unsuitable to the climate of Britain, and of other parts of Europe where it has been tried, perishing on the approach of the frosts of winter without having perfected its roots. The dry weather of summer is also unfavourable to it. The climate of the south of Ireland resembles that of its native regions more than any other in the British Islands. It seems to require a very regular temperature and constant moisture. There are probably some parts of the British colonies in which the arracacha would be found a very valuable plant. In deep loose soils

Arracacha.

it yields a great produce. It is generally propagated, like skirret, by offshoots from the crown of the root. By rasping the root and washing, a starch, similar to arrowroot, is obtained.—There is another species of the same genus, *A. moschata*, the root of which is uneatable.

Arracan. See ARAKAN.

Arrack, or RACK, is an East Indian name (derived from the Arabic) for all sorts of distilled spirituous liquors, but chiefly to that procured from *toddy* or the fermented juice of the coco and other palms, as well as from rice and the kind of brown sugar called *jaggery*. The palms in other tropical countries furnish a fermented beverage similar to the toddy of India, and in a few instances also it is distilled, but arrack essentially belongs to India and the adjacent countries. The coconut palm (*Cocos nucifera*) is a chief source of toddy or palm-wine, which is obtained from trees ranging from twelve to sixteen years old, or in fact at the period when they begin to show the first indication of flowering. After the flowering shoot or spadix enveloped in its spathe is pretty well advanced, and the latter is about to open, the toddy-man climbs the tree and cuts off the tip of the flower-shoot; he next ties a ligature round the stalk at the base of the spadix, and with a small cudgel he beats the flower-shoot and bruises it. This he does daily for a fortnight, and if the tree is in good condition, a considerable quantity of a saccharine juice flows from the cut apex of the flower-shoot, and is caught in a pot fixed conveniently for the purpose, and emptied every day. It flows freely for fifteen or sixteen days, and less freely day by day for another month or more; a slice has to be removed from the top of the shoot very frequently. The juice rapidly ferments, and in four days is usually sour: previous to that it is a favourite drink known in some parts of India as callu, and to the Europeans as toddy. When turning sour, it is distilled and converted into arrack. It is largely manufactured in Goa, Batavia, Ceylon, and Siam. A similar spirit is made pretty largely from the magnificent fan-leaved palm, *Borassus flabelliformis*, and also from the so-called date-sugar palm, *Arenga saccharifera*. The name is also given to a spirit obtained from rice and sugar fermented with coconut sap. An imitation arrack may be prepared by dissolving benzoic acid in rum.

Arragon. See ARAGON.

Arrah, a town of Bengal, 368 miles NW. of Calcutta. Here in 1857 a dozen Englishmen, with 50 Sikhs, held out for eight days in a small bungalow against 3000 sepoys. A force despatched to their aid fell into an ambuscade, and lost 290 out of 415 men; but finally they were relieved by Major Eyre. Pop. 50,000.

Arraignment, in the practice of the criminal law in England, means calling a prisoner by his name to the bar of the court to answer the matter charged upon him in the indictment. His innocence being presumed, it is the law, and is so laid down in the most ancient books, that, though charged upon an indictment of the gravest nature, he is entitled to stand at the bar in the form and in the garb of a free man, without irons or any manner of shackles or bonds, unless there be evident danger of his escape, or of violence at his hands. When arraigned on the charge of treason or felony, the prisoner may be called upon by name to hold up his hand, by which he is held to confess his identity with the person charged. This form, however, is not an essential part of the proceedings at the trial, and it is sufficient for the prisoner, when arraigned, to confess his identity by verbal admission or otherwise. When thus duly arraigned, the indictment is distinctly read over to the accused in the English tongue, and he then either confesses the fact—that is, admits his guilt—or he puts himself upon his trial by a plea of 'Not Guilty.' If, as occasionally used to happen, the prisoner stood mute—that is, persistently refrained from or refused a direct answer to the indictment—the court proceeded to inquire whether the silence was of malice on the part of the prisoner, or was produced by the visitation of God. In old days the contumacious prisoner became liable to the appalling procedure of the Peine Forte et Dure (q.v.). But by the statute of 1828 (7 and 8 Geo. IV. c. 28) it was enacted that where a prisoner shall stand mute of malice, it shall be lawful for the court to order the proper officers to enter a plea of 'Not guilty,' on which the trial shall proceed, as if the plea had been actually pleaded by the prisoner himself. Where, however, there is room for doubt as to the sanity of the prisoner standing mute, a jury consisting of any twelve persons who may happen to be present is forthwith charged to inquire whether he has intellect enough to plead and to understand the course of the proceedings. If they find the affirmative, the plea of 'Not guilty' is entered, and the trial goes on; but if the negative, the insane person is ordered by the court to be kept in strict custody during His Majesty's pleasure, according to a relevant statute passed in 1800.

In the Scots criminal law, the expression *Calling the Diet* corresponds to arraignment. The prisoner is called upon by name by the presiding judge to attend to the indictment against him, which is read aloud by the clerk, and the prisoner is then required to plead, as in England, either 'Guilty' or 'Not guilty.' If 'Not guilty,' the trial proceeds—the prisoner, either by himself or his counsel, having always the last word.

The term arraignment is derived from the Old French *araisnement*, from *araisnier*, Lat. *adrationare*. See CRIMINAL LAW, PLEA.

Arran, an island of Buteshire, in the Firth of Clyde, 5¾ miles SW. of Bute, 10 W. of Ayrshire, and 3 E. of Kintyre, from which it is separated by Kilbrannan Sound. It is of an oval form, 19 miles long and 10½ broad, with an area of 166 sq. m., about a seventh part being cultivated. Pop. in holiday season, 8300. The general aspect of Arran is mountainous, and in the north the jagged peaks are singularly grand. All around the coast is the low platform of an ancient sea-margin, with lofty cliffs on the S. and SW., from which the country rises abruptly. The highest point is Goatfell (2866 feet), a very prominent feature of the island. From its sides slope the romantic glens of Rosa and Sannox, and at its base to the SE. opens Brodick Bay, at the head of which lay, until lately, Brodick village. The new village is at Invercloy, on the opposite side of the bay. To the south, round a bluff headland, is Lamlash Bay, the chief harbour of Arran, and the best on the Firth of Clyde, sheltered by Holy Island, once the seat of a monastery. A picturesque mass of columnar basalt, 1030 feet high, succeeds. Farther south lies Whiting Bay, near which are two cascades 100 and 50 feet high respectively. Whiting Bay has of late outstripped its neighbours as a holiday-resort. At the SE. point of Arran is Kildonan Castle, opposite which is the small isle of Pladda. Large caverns occur in the cliffs of the S. and SW. coast. In one of these, the 'King's Cave,' north of the columnar promontory of Drumadoon, Bruce hid for some time. Shiskine Vale, opening into Drumadoon Bay at Blackwaterfoot, is the most fertile part. Loch Ranza, a bay in the north end, is a herring-fishing rendezvous. The island is a favourite summer-resort. Arran is in some respects unique, contain-

ing, as it does, a fuller record of several geological epochs than any other part of the British Isles of equal extent. The oldest rocks represented are schists, grits, and conglomerate, which are confined to the northern part of the island, where they form a belt that almost completely encircles the large circular area of granite of which Goatfell is the culminating point. A narrow strip of Silurian crosses north Glen Sannox in the NE., immediately to the east of which appears a band of Old Red Sandstone that trends south along the margin of the granite to near Brodick Bay, and thereafter crosses the island to Machrie Bay. Strips of Carboniferous strata occur along the margin of the Old Red Sandstone on the south and east side of the island, but they are much broken and interrupted by faults. They are well seen, however, on the coast at Corrie, and between the Fallen Rocks and the Cock. The Trias occupies a wide area in the south of Arran, but is largely overlaid by igneous rocks of various kinds; it is well exposed, however, in certain valleys and along the sea-coast. That strata of still younger age formerly overspread the island is shown by the occurrence of large blocks and masses of Lias and Cretaceous in a great volcanic vent midway between Brodick Bay and Machrie Bay. The volcanic phenomena of Arran are specially interesting—no fewer than seven separate zones of volcanic rocks having been detected, ranging in age from Silurian to Tertiary times. It has now been definitely ascertained that the granite of Goatfell, &c., belongs to the latest period (Tertiary) of volcanic activity. Glacial phenomena are well developed everywhere. The chief crops are oats and potatoes. The island belonged almost wholly to the Dukes of Hamilton, but passed by marriage to the House of Montrose. Many antiquities occur, such as cairns, standing stones, and stone circles. Loch Ranza Castle, now in ruins, was once a residence of the Scots kings. From Brodick Bay, Bruce sailed to Carrick on his memorable expedition. Standard works are Landsborough's, Bryce's (for geology), and *The Book of Arran* (ed. Balfour and Mackenzie, 1910–14).

Arranging, a term in music which means the adapting of a piece of music so as to be performed on an instrument or instruments different from those for which it was originally composed. It corresponds with the work of translation in literature, and requires similar gifts. The pianoforte arrangements of Franz Liszt have excelled all others, although in some cases he may have overstepped the boundary of propriety. Many classical masters, especially Bach, Beethoven, and Mendelssohn, have arranged their own music.

Arras, the capital of the French department of Pas-de-Calais, on the navigable Scarpe, 120 miles N. of Paris. It consists of an old town on an eminence, and a new town in the plain. Among the principal edifices are the cathedral (1755–1833) and the old citadel. The beautiful Gothic hôtel-de-ville (1510) and its belfry were destroyed in the World War (q.v.). There are manufactures of lace, hosiery, beet-sugar, and agricultural implements, and a brisk trade in corn and oil. It was long so famous for its tapestry that in England the name *arras* was given to tapestry hangings. Arras was the capital of the Celtic Atrebates (whence the name), and subsequently of the province of Artois. As such it was long a part of Burgundy. It was ceded to France in 1482, but came to Austria in 1493; nor did it finally become French till 1640, when Louis XIII. took it after a long siege. Robespierre was a native. Pop. 25,000.

Arrest. To arrest an offender or a debtor is to seize his person, in order that he may be brought to trial, or compelled to obey the law. In English criminal practice, arrest may take place in two ways: (1) *Without Warrant.*—According to Mr Justice Stephen, any person may arrest any one who commits a felony or gives a dangerous wound in his presence, any one whom he reasonably suspects of felony (if a felony has in fact been committed), or any one whom he finds committing certain offences specially provided for by statute. A peace-officer may also arrest any one who commits a breach of the peace in his presence, or any one whom he reasonably suspects of felony (whether a felony has been committed or not). His statutory powers of arrest are also wider than those of private persons; he may, for example, arrest any person whom he finds loitering at night, whom he has reason to suspect of having committed or being about to commit a crime; and (in the Metropolitan district) any person loitering at night who cannot give a satisfactory account of himself. (2) *With Warrant.*—A warrant is an order addressed by a judge or magistrate to a peace-officer, or to the officers within a certain district. If the person against whom it is issued is not within the jurisdiction of the authority issuing it, the warrant must be 'backed' by a magistrate of the place where such person is, or is supposed to be. Warrants issued in one part of the United Kingdom may be backed by a magistrate in another part. By an act of 1881, provision has been made for backing warrants throughout His Majesty's dominions. The act applies to treason, piracy, and every offence which, by the law of that part of the empire where it was committed, is punishable by twelve months' imprisonment with hard labour. For the arrest of offenders against foreign law, or of offenders against British law taking refuge in a foreign country, see EXTRADITION.

In executing a warrant, or in making a lawful arrest, an officer, or even a private person, may break open doors in pursuit of the person whom he is authorised to take. Obstruction of an officer making an arrest has always been treated as a serious offence; it seems that a person may still be charged with treason if he rescues a prisoner charged with treason. Modern legislation treats this offence as a misdemeanour, for which imprisonment with hard labour is the appropriate punishment. But to rescue a murderer or a prisoner is punishable by penal servitude. The same subject is treated in Scotch law under the head *Deforcement*, which Sir Archibald Alison, in his work on the Criminal Law of Scotland (vol. i. p. 491), says, 'consists in the resistance to the officers of justice in the execution of their duty.' It is essential to such deforcement that it should be such as to defeat the warrant or other process which authorises the arrest. Mere unsuccessful attempts with this view are charged under the name of 'resisting and obstructing the officers of the law in the execution of their duty.'

On the other hand, persons who are active in assisting the officers of the law may be compensated for their expense and trouble, as provided by an act of 1851, which amends and extends the provision contained in an act of 1827. A special allowance may be made to any person who has shown extraordinary courage, diligence, or exertion.

In English civil procedure, arrest takes place only in exceptional cases. All the superior courts have power to arrest or attach persons for contempt. By an order of the court or a judge (which is not made without notice to the party), a writ may be issued to the sheriff, commanding him to arrest a certain person, and have him before the court to answer his contempt. Defendants on civil process were formerly arrested by means of the writ of *ca sa* or *capias ad satisfaciendum*. But this writ is now rarely issued, unless in the cases expressly

excepted out of the Debtors Act, 1869. That act put an end to imprisonment for debt, except where non-payment of money due involved contempt of or disobedience to the order of a competent court, as, for example, where a trustee refuses to comply with the order of a court of equity. Orders of committal are now made for the most part by judges of county-courts, to compel payment of a debt by instalments, where the debtor is drawing weekly wages, or has other means of paying the instalments, but has no furniture or other goods on which execution can be levied.

Arrest may also be made to prevent a debtor from absconding, or from removing his property out of the jurisdiction. Ancient writs available for this purpose were those of *capias ad respondendum* and *ne exeat regno;* the modern practice is regulated by the Debtors Act, 1869, and the Bankruptcy Act, 1883, sect. 25. Arrest on mesne process (i.e. during the progress of a suit, and before judgment given) is now abolished, except as above explained.

The following are privileged from arrest on civil process: Ambassadors and diplomatic representatives of foreign courts; peers of the United Kingdom; Scottish and Irish peers; members of parliament; clergymen during divine service, or going to or returning from service; and all persons attending any court of justice, as parties, witnesses, solicitors, or counsel. Barristers are probably entitled to their privilege only when attending the superior courts; Archbold, in his *Practice of the Common Law*, refers to a case where a barrister was discharged who was arrested on circuit. Persons in attendance on the sovereign are privileged; writs of protection were formerly issued to persons in the royal service, but this prerogative is now seldom or never exercised. In regard to privilege of parliament, it may be observed that though members of both Houses are free from arrest on civil process, actions may be brought against them; and the 10 Geo. III. chap. 50 provides that such actions are not to be delayed on pretence of privilege. It is also provided by the Bankruptcy Act, 1883, that if a person having privilege of parliament becomes bankrupt, he may be dealt with as if he had no privilege. No person who is a bankrupt may sit in either House; and if a member of the House of Commons fails to satisfy his creditors within a year after he is adjudicated a bankrupt, his seat becomes vacant. Privilege does not exempt any person from arrest for contempt of court.

In the Scots law, the word arrest is not a technical term for process against the person. But see ARRESTMENT and ARRESTMENT FOR FOUNDING JURISDICTION; also ATTACHMENT.

Arrestment, in the Scots law, is the legal process or diligence, as it is called, by means of which a debtor is prohibited from making payment or delivery to his creditor until another debt or claim due to the person making use of the arrestment is secured or paid. Thus, if A owes £100 to B, but B, again, is indebted to C, arrestment may be used by C in the hands of A; the effect of which is to prevent A paying to B until C's claim has been satisfied. A, the party in whose hands the arrestment is laid, is called the arrestee; C, the user of the arrestment, is called the arrester; and B, the arrester's debtor, is called the common debtor. The arrestment, however, has not the effect of transferring the debt or subject arrested. For that purpose, a particular form of action, called *an action of furthcoming*, is necessary, decree in which operates as a complete transfer to the arrester. Arrestment in security is also used on the dependence of an action, so as to secure the debt which the pursuer expects to establish by decree. Arrestments are frequently recalled by the court as oppressive. The court, on petition, may recall or restrict an arrestment, either on caution or without caution. The corresponding diligence against land is called Adjudication for Debt, or, if in security, Inhibition.

The corresponding English term is Attachment of Debts (q.v.).

ARRESTMENT FOR FOUNDING JURISDICTION is a procedure in Scots law, by which a foreigner, or other debtor abroad, who is not subject to the jurisdiction of the Scottish courts, but who has movable property in Scotland, may be made subject to the jurisdiction of the Court of Session. By the Sheriff Courts Act, 1907, arrestment may found jurisdiction in the Sheriff Court. In the ordinary case, what is attached is money due to the foreigner, and any sum, however small, and any movable, if of appreciable value, is sufficient. The procedure is therefore one liable to great abuse; it should not be extended beyond the convenience of trade, on which the custom was originally based in the Netherlands. In practice it has been extended to all actions of a pecuniary nature, but not to actions relative to *status*. The practice must be treated as an exception to the general rule that a pursuer should go to the court of his debtor's residence. The only equivalent in England is the custom of foreign attachment in the city of London. Heritable property in Scotland is a distinct ground of jurisdiction against foreigners without special procedure.

ARRESTMENT OF WAGES, so far as required for the aliment of the artisan or servant, has always been prohibited by the common law of Scotland. Similarly, salaries annexed to offices and pensions granted by the Crown are regarded as alimentary debts, and are not arrestable. By statute in 1845, the arrestment of wages was prohibited absolutely in small-debt actions. The limit of what is required for aliment in the case of artisans and farm-servants and labourers was fixed by statute in 1870 at 20s. per week, the excess being arrestable. This rule, however, does not apply to claims for rates and taxes, or to decrees for aliment.

Arrhena'therum, a genus of Grasses (q.v.).

Arrhenius, SVANTE AUGUST, born 1859 near Uppsala, was educated at the university there, and in 1895 became professor at Stockholm. Much of his best work was done in establishing the 'ionic' theory of electrolytic dissociation, which has profoundly influenced modern chemical doctrine and research. He also published a text-book of electrochemistry (trans. 1902) and of cosmic physics, and wrote on the relations of chemistry to toxins, antitoxins, and serum-therapy, and on cosmic evolution. He died 2d October 1927.

Arrian, FLAVIUS, a native of Nicomedia, in Bithynia, was born about 100 A.D. A disciple of Epictetus, the Stoic philosopher, he was admitted to the citizenship in Athens, and in 124 A.D. to that of Rome at the hands of the Emperor Hadrian. He was appointed prefect of Cappadocia in the year 136, and under Antoninus Pius, the successor of Hadrian, he was promoted to the consulship. But some four years afterwards, he appears to have retired from public life, and devoted himself to literature in his native place, where he died at an advanced age in the reign of Aurelius. As the pupil and friend of Epictetus, he edited the Manual of Ethics (*Enchiridion*) left by his master, and wrote the lectures of Epictetus (*Diatribæ*) in eight books, of which only four have been preserved. The most important work by Arrian is the *Anabasis Alexandrou*, or history of the campaigns of Alexander the Great, which has come down to us almost entire. This book is our chief authority on the

subject of which it treats, and is of great value. Arrian chose Xenophon as his model, and hence the Athenians called him the young Xenophon. In close connection with his former history, Arrian wrote his Indian History, giving an account of the people of India. His letter to Hadrian on a voyage round the Euxine Sea is valuable with regard to ancient geography. Another *Periplus* of the Euxine and one of the Red Sea are not his.

Editions of the *Anabasis* are by Krüger (1848), Sintenis (1867), Abicht (1876), Chinnock (1893), and Roos (1907); a trans. by Chinnock (1884).

Arrondissement, an administrative district forming a subdivision of a French Department (q.v.).

Arrow. See ARCHERY.

Arrow-grass, the popular name of *Triglochin*, a genus of Juncaginaceæ, of which two species occur in Britain.

Arrowhead (*Sagittaria*), a genus of petaloid monocotyledons of the family Alismaceæ, distinguished by unisexual flowers, having three herbaceous sepals and three coloured petals, with numerous stamens and carpels, the latter separate. They are aquatic plants, natives of very different climates, from the tropics to the cold regions of the world.—The Common Arrowhead (*S. sagittifolia*) is a beautiful aquatic, a native of England, with arrow-shaped leaves which rise above the surface of the

Arrowhead (*Sagittaria sagittifolia*).

water. It is one of those plants which have enjoyed an undeserved reputation as cures for hydrophobia. The starchy corms have sometimes been used for food, but have an acrid unpleasant taste. It has long been cultivated in China and Japan. Several species and many varieties of this genus are found in North American waters.

Arrow-headed Characters. See CUNEIFORM.

Arrow-heads. See ELF-BOLTS and FLINT IMPLEMENTS.

Arrow-poison. See ARCHERY, and articles there referred to.

Arrowroot is a variety of starch extracted from the roots of certain plants growing in tropical countries. It is a fine starchy farina, much valued as a delicacy, and as an easily digestible food for grown children and invalids. It is obtained from the root-stocks (*rhizomes*) of different species of *Maranta*, belonging to the Marantaceæ (Scitamineæ). The species chiefly yielding it is *M. arundinacea*, a native of tropical America, cultivated in the West India Islands, and growing about 2 feet high, with ovate-lanceolate somewhat hairy leaves, clusters of small flowers on two-flowered stalks, and globular fruit about the size of currants. The rhizomes are often more than a foot long, of the thickness of a finger, jointed, and almost white, covered with large papery scales. They are dug up when a year old, washed, carefully peeled, and reduced to a milky pulp. In Jamaica the roots are reduced by beating in deep wooden mortars; in Bermuda, by means of a wheel-rasp; but modern machinery has now been introduced. The pulp is

Arrowroot (*Maranta arundinacea*):
A, flowering branch; B, base of flower stem; C, branch of the rhizome. (From Bentley and Trimen's *Medicinal Plants*.)

then mixed with much water, cleared of fibres by means of a sieve of coarse cloth or hair, and the starch is allowed to settle to the bottom. The water dissolves, and so removes the greater part of the albumen and salts, the starch quickly settling down as an insoluble powder, which is then purified by successive washings. The arrowroot is finally dried in the sun or in drying-houses, from which dust and insects are excluded by means of gauze. The careful peeling of the roots is of great importance, as the skin contains a resinous matter which would impart a disagreeable flavour. Great precautions are taken against impurities; and the knives used in peeling the roots, and the shovels used in lifting the arrowroot, are made of German silver. The West Indian arrowroot most esteemed in the market is grown in Bermuda; the next, and almost equal to it, in Jamaica. The East Indian arrowroot is not in general so highly valued, perhaps because substitutes for the genuine arrowroot more frequently receive that name. The *Maranta arundinacea* is now, however, cultivated to some extent both in the East Indies and in Africa. *M. indica* is to be regarded as a mere variety, with perfectly smooth leaves. It is cultivated both in the East Indies and in Jamaica, and other species and varieties are sometimes cultivated. What is called Florida arrowroot is in part prepared from *Zamia integrifolia;* but the genuine Maranta arrowroot is also produced in Florida.

The amount of starch present in the rhizomes varies, according to age, from 8 to 26 per cent.

Arrowroot is exported in tin cases, barrels, or boxes, carefully closed up. It is a light, opaque, white powder, which, when rubbed between the fingers, produces a slight crackling noise, like that heard when newly fallen snow is being made into a snowball. Through the microscope the particles are seen to be convex, more or less elliptical, sometimes obscurely triangular, and not very different in size. The dry starch is quite inodorous, but when dissolved in boiling water, it has a slight peculiar smell, and swells up into a very perfect

jelly. Potato-starch, with which it is often adulterated, may be distinguished by the greater size of its particles, their coarser and more distinct rings, and their more glistening appearance. Refined sago-flour is used for adulteration, many of the particles of which have a truncated extremity, and their surface is irregular or tuberculated. Arrowroot is also sometimes adulterated with rice-starch, and with the common starch of wheat-flour.

Tapioca (see MANIOC) was formerly sometimes called Brazilian arrowroot; and the starch prepared from many other plants has often also usurped the name. Thus 'Chinese arrowroot' is said to be from the tubers of *Nelumbium speciosum*. East Indian arrowroot is often prepared from different species of Curcuma (see TURMERIC), and of Tacca (family Taccaceæ), while *Dion edule*, Zamia, and other cycads are used in Mexico, and so on; even the starch of maize sometimes appearing as Oswego arrowroot, that of Arum as Portland arrowroot, and that of potato as 'English arrowroot.' Although materially differing in rate of digestibility, arrowroot proper having in this respect the advantage, all these varieties of starchy food have much the same nutritive value, and all alike require the addition of milk to form an adequate food. It should further be borne in mind that all starches alike are indigestible to infants, whose salivary ferment is undeveloped.

The name has been (probably wrongly) supposed to arise from use of the fresh roots to counteract the effects of poisoned arrows; and the expressed juice has been accordingly recommended as an antidote to poisons, and a cure for the stings and bites of venomous insects and reptiles.

Arrowsmith, AARON, born at Winston, Durham, in 1750, at the age of twenty came up to London, and by 1790 had established a great map-making business, his chief productions being maps of the World, North America, Scotland, and Southern India. He died 23d April 1823.—His nephew, JOHN (1790–1873), was also an eminent cartographer.

Arroyo Molinos, a village in Estremadura, Spain, noted as the scene of the complete discomfiture of the French forces under General Girard by Lord Hill on the 28th October 1811, who took 1500 prisoners, the whole artillery, colours, baggage, &c., with a trifling loss to himself. French historians (Thiers and others) maintain that the battle was 'undecided.'

Arru Islands, a group of over eighty islands in the Dutch East Indies, lying west of New Guinea, with a united area of about 2650 sq. m., and a population of some 25,000. The largest island is Tanna-Besar (77 miles long by 50 broad). The surface is low, and the coasts are steep and inaccessible, on the east side fringed with coral reefs. The soil is covered with the most luxuriant vegetation. The islands are remarkably rich in animal life, especially birds, mostly related to those of New Guinea. The inhabitants resemble the Melanesians of New Guinea more than the natives of the Moluccas. On the ground of this inclination to the Papuan type, in connection with the peculiar formation of the Archipelago, Russel Wallace advanced the theory that the Arru Islands formed originally a part of New Guinea. There is an active trade, but not in native hands. Cotton and woollen goods, iron and copper wares, Chinese pottery, knives, rum, rice, opium, and arrack are imported, and bartered for mother-of-pearl, trepang, edible nests, pearls, tortoise-shell, and the skins of birds of paradise.

Arsacidæ, a dynasty of Parthian kings, so called from the name of its founder, Arsaces, who wrested a kingdom for himself from the feeble grasp of the Seleucid Antiochus II. about 250 B.C. Its greatest kings were Mithridates, Phraates, Mithridates 'the great,' Volagases I., and Artabanus, who lost his crown and his life at Hormizdján, in 226 A.D., in his attempt to stem the conquering career of Ardashír, first of the Sassanian kings of Persia (q.v.); see ARMENIA, PARTHIA.

Arsamas, a Russian town, 60 miles S. of Nijni-Novgorod. It has thirty-four churches, three monasteries, important leather manufactures, and considerable trade in sail-cloth and sheep-skins. Pop. 12,000.

Arsenal (through Ital. and Span. forms from Arab. *dār aççinā'ah*, 'workshop,' made up of *dār*, 'house,' *al*, 'the,' *cinā'ah*, 'art.' The Span. *atarazana* best preserves the wider sense of the Arabic original; the other languages have narrowed its meaning to 'dock' or 'armoury'), a term formerly applied merely to a repository of naval stores and ordnance, but now extended to the foundries and factories of warlike stores, for both army and navy, as well as to the depôts where they are stored. The principal arsenals of Great Britain, in their true sense as naval stores and dockyards, are at Deptford, Chatham, Pembroke, Sheerness, Portsmouth, Plymouth, Rosyth. The only government foundry for shell and heavy guns in Great Britain is at Woolwich (q.v.); but there are several privately owned arsenals. There is a manufactory of small-arms at Enfield, and abroad arsenals at Gibraltar, Malta, and Calcutta, with a gun-factory at Cossipore. During the Great War vast temporary arsenals were constructed to manufacture munitions, most notable being Gretna. See DOCKYARDS.

Arsenic (through Lat. from Gr. *arsenikon*) is the name popularly given to a well-known poison, arsenious oxide, but, strictly speaking, the term is restricted to the metal, of which the symbol is As, and the atomic weight 75. The metal arsenic is found free in nature, but in a state of combination it occurs more frequently. The most important of all arsenical minerals, because of their use as ores of arsenic, for the preparation of white arsenic, or arsenious oxide, are those in which arsenic is combined with nickel and cobalt. The chief of these are arsenical pyrites, or leucopyrite, nickeline, cobaltine, and smaltine, which are found in Cornwall and the continent of Europe, as well as in other parts of the world. The last-named two are used for the preparation of blue colours for porcelain or stoneware. The presence of arsenic in a mineral may commonly be detected by the garlic odour which it emits before the blowpipe.

The metal is generally prepared from native arsenic, or arsenical pyrites. The latter is heated in long earthenware retorts with condensing chambers attached. The arsenic volatilises over into the receivers, where it condenses as a crystalline solid, leaving sulphide of iron. It is purified by redistillation. At present the supplies come from Germany, Spain, England, and America. Metallic arsenic is very brittle, can easily be reduced to powder by hammering, or even pounding in a mortar; and when a freshly cut surface is examined, it presents a brilliant dark steel-gray lustre, which, however, readily tarnishes on exposure to the air. The metal, as such, is not considered poisonous, but when introduced into the animal system it is there faintly acted upon by the juices and in part dissolved, at the same time exhibiting poisonous properties. When heated in the open air it burns with a peculiar bluish flame, and emits a characteristic garlic odour. The only use to which the metal arsenic is applied in the arts is in the manufacture of leaden shot of the various sizes, when its presence in small quantity in the lead renders the latter much more brittle

than it ordinarily is. Of all the compounds of arsenic the most important is the one already alluded to—namely, arsenious oxide. With sulphur, arsenic forms two important compounds: *Realgar*, As_2S_2, a red, transparent, and brittle substance, which is employed in the manufacture of the signal-light called *White Indian Fire;* and *Orpiment*, As_2S_3, or *King's Yellow*, a cheap pigment of a yellow colour. With hydrogen, arsenic forms arsenuretted hydrogen (arsine), AsH_3, a very poisonous gas, and one which has been fatal to several chemists.

Arsenious Oxide is the arsenical compound most familiarly known. It is obtained principally during the roasting of the arsenical nickel ores in Germany in furnaces communicating with flues. When the arsenic of the ore burns, it passes into the condition of arsenious oxide, As_2O_3, and rising as vapour into the somewhat cool flue, is there deposited as a grayish powder, known by the names of *Smelting-house Smoke, Flowers of Arsenic, Poison-flour*, or *Arsenical Soot.* In this condition the arsenious oxide is contaminated with some impurities, from which it may be separated by introducing the gray powder into an egg-shaped vessel, and applying heat at the lower end, when the arsenious oxide rises in vapour, and condenses in the cool end as a transparent glassy or vitreous substance. Ordinary arsenious oxide of the shops (which is what is popularly known as *arsenic*) is a white crystalline powder, which feels decidedly gritty, like fine sand, when placed between the teeth, and has no well-marked taste. It is very heavy, so much so as at once to be noticeable when a paper or bottle containing it is lifted by the hand. It is soluble in about 10 parts of boiling water, or 100 parts of cold water. As ordinarily sold in quantities under 10 lb. in weight, the arsenious oxide is required by law to be coloured with $\frac{1}{32}$ of its weight of indigo, or $\frac{1}{16}$ of its weight of soot, the object of the admixture being to render any liquid to which the arsenious oxide might be added, with a murderous intent, of a black or bluish-black hue, and thus indicate the presence of something unusual. In packages of 10 lb. and upwards, arsenious oxide is allowed to be sold in the pure white crystalline form without coloration. When placed in a spoon, or other vessel, and heated, the arsenious oxide volatilises, and condenses in crystals on any cool vessel held above. Again, when arsenious oxide is placed on a red-hot cinder, the strong garlic odour characteristic of arsenic is given off. When thrown upon water, notwithstanding its great density (specific gravity 3·70) it partially floats on the surface, as wheat-flour does; and that portion which sinks in the water rolls itself into little round pellets, which are wetted only on the outside, and contain much dry arsenious oxide within. With water, arsenious acid is formed, which is soluble in water. Arsenious oxide is the anhydride of the acid. The solution of arsenious acid in water is recognised by three tests:

(1) Hydrosulphuric acid and hydrochloric acid produce a *yellow precipitate* of sulphide of arsenic, As_2S_3, soluble in ammonia.

(2) Ammonio-sulphate of copper, an *apple-green precipitate* of arsenite of copper, $CuHAsO_3$.

(3) Ammonio-nitrate of silver, a *yellow precipitate* of arsenite of silver, Ag_3AsO_3.

In many cases arsenious oxide is used as a means of destroying animal life, but, happily, the processes for the detection of the poison in organic mixtures and in the animal tissues are unerring and trustworthy.

For the isolation and recognition of arsenious oxide in organic mixtures, such as the contents of a stomach, the method generally pursued is called Reinsch's process, from the name of its discoverer. The manner of its application is to treat the organic mixture with water sufficient to render it thin, then add hydrochloric acid to the extent of one-eighth of the volume of the liquid, apply heat, and when the whole has been raised to near the boiling-point, introduce clean, newly burnished pieces of copper in the form of wire, gauze, or foil. If arsenious oxide be present in the mixture, a steel-gray coating of metallic arsenic will form on the surface of the copper. This apparent tarnishing of the copper may take place when no arsenious oxide is in the mixture, and may be produced by salts of mercury, antimony, &c., as well as by sulphur compounds, and even occasionally by fatty matters. To distinguish between the coating formed by arsenious oxide and that produced by other substances, the copper is taken out of the mixture, washed with water to remove acid, immersed in ether to dissolve off any adherent fatty matter, dried between folds of blotting-paper, introduced into the lower end of a dry glass test-tube, and there cautiously heated. The metallic arsenic, As, is driven off by the heat from the surface of the copper, rises in vapour into the upper portions of the test-tube, there meets the oxygen of the air, with which it combines, forming arsenious oxide, As_2O_3, and deposits itself in the cool part of the tube in little glistening crystals. On cooling, the arsenic is obtained in a convenient form for applying tests. This method is not altogether free from possible error, for copper and hydrochloric acid sometimes contain traces of arsenic, for which they must be previously tested. For other medico-legal tests and modifications of the foregoing, see books on poisons, &c.

Arsenious oxide forms with bases salts called arsenites. Arsenious oxide, boiled with a solution of potash, or carbonate of potash, forms an arsenite of potash, used in medicine, and known as *Fowler's Solution* or *liquor arsenicalis.* Many sheep-dipping mixtures are composed of arsenious oxide, soda, sulphur, and soap, which, when used, are dissolved in a large quantity of water, and thus constitute essentially dilute solutions of arsenite of soda. A compound of arsenious oxide and the oxide of copper, called the arsenite of copper, or *Scheele's Green*, is a pigment used by painters as a pretty and cheap green paint. The same substance is, or was formerly, extensively employed in the manufacture of common green paper-hangings for the walls of rooms; and it seems certain that rooms covered with paper coated with this green arsenite of copper are detrimental to the health of human beings residing therein, from the readiness with which minute particles of the poisonous pigment are detached from the walls by the slightest friction, are diffused through the room, and ultimately pass into the animal system. Another green pigment is named *Schweinfurth Green*, and contains arsenious oxide, oxide of copper, and acetic acid, being a double arsenite and acetate of copper; it is also called *Paris Green*, and used as an insecticide, and for the destruction of parasitic fungi.

When taken into the stomach arsenic is soon absorbed into the blood, acting powerfully in such skin diseases as Psoriasis, Lepra, Eczema (q.v.), &c., and in Cancer. As a tonic alterative it holds a high place. The usual method of administering arsenic is in small doses (from three to five drops) of the liquor arsenicalis, largely diluted with water, twice or thrice in a day. When it is given, in the doses above mentioned, for eight or ten days, symptoms of poisoning begin to appear, the skin becoming hot, the pulse quick, the eyelids hot and itchy; the tongue has a silvery appearance; the throat is dry and sore, the gums swollen and tender; and if the treatment is persisted in,

salivation ensues, and then come nausea, vomiting, diarrhœa, nervous depression, and faintness. The quantity necessary to destroy life, of course, varies, but under circumstances favourable for its operation the fatal dose for an adult is from *two* to *three grains*. Death from a poisonous dose of arsenic may occur in a few hours, or after the lapse of days. Arsenic has been used frequently as a slow poison, the symptoms being attributed to inflammation of the bowels from natural causes. Fortunately, in most cases its detection is easy.

In some countries, especially in Austria, arsenic is given to cattle and horses to render the skin bright and glossy. In Styria arsenic is taken by the peasant girls to increase their personal attractions; and it has been definitely ascertained that over a considerable area, including Styria, Carinthia, Salzburg, Tirol, Lower Austria, and the Erzgebirge, arsenic-eating is largely practised by men, who nevertheless attain a healthy old age. Arsenic-eaters, who generally begin the use of the drug secretly, say that it improves the complexion, increases the digestive powers, and so strengthens the respiratory organs as to enable the bearers of heavy burdens to climb mountains with ease. At first a dose may be taken once a week, afterwards daily; and there are authenticated cases of men who consume six grains—enough to poison three men—at one dose without inconvenience. Once the habit is established, it is impossible to give up arsenic-eating, terrible heart-gnawings following any attempt gradually to stop the practice; and sudden cessation causes death. Arsenic-poisoning in England, causing many deaths in 1900, was traced to the presence of the poison in beer, due to the employment of impure sulphuric acid in preparing the 'inverted' sugar used in brewing.

The *antidote* for arsenic-poisoning is a mixture of hydroxide of iron and oxide of magnesium. This is given in a moist state every few minutes until the urgent symptoms are relieved. If this is not to hand, one is recommended to evacuate the stomach, either with a vacuum-pump or else to cause vomiting by tickling the throat with a feather. Then demulcent drinks should be given, such as milk, white of egg and water, or flour and water. If the fatal symptoms be averted, let the patient for a long time subsist wholly on farinaceous food, milk, and demulcents.

Arsenopyrites, or MISPICKEL, a mineral consisting of arsenosulphide of iron (FeAsS), often worked (as in Cornwall) as an ore of arsenic. It is opaque, silver-white with grayish-black streak and metallic lustre; hardness, 5½; sp. gr., 6. It crystallises in the orthorhombic system, the crystals being twinned.

Arsin'oë, daughter of Ptolemy I., king of Egypt, born 316 B.C., married at sixteen the aged Lysimachus, king of Thrace, whose eldest son, Agathocles, had already wedded Lysandra, her half-sister. Desirous of securing the throne for her own children, Arsinoë prevailed on her husband to put Agathocles to death; whereupon Lysandra fled with her children to Seleucus in Asia, and induced him to declare war against her unnatural father-in-law. Lysimachus was slain, and Seleucus seized the kingdom. Arsinoë now sought refuge in Macedonia, which, however, was also taken possession of by Seleucus; but on his assassination, a few months later, by Ptolemy Ceraunus, her half-brother, she received a hypocritical offer of marriage from the usurper, who wanted to destroy her two sons lest they should prove formidable rivals to his ambition. She consented to the union, and opened the gates of the town in which she had taken refuge, but her children were butchered before her eyes. She then fled to Egypt, where, in 279, she married her own brother, Ptolemy II. Philadelphus.—There was a city of Arsinoë in Middle Egypt, formerly called Crocodilopolis; another near the head of what is now the Gulf of Suez; and three of the same name in Cyprus.

Arsinoïtherium, a remarkable Eocene mammal found by Andrews in 1902 in the Fayyûm in Egypt (along with ancient elephants, turtles, &c.)—a huge prehistoric rhinoceros with a pair of small horns behind the two enormous nasal horns. See Ray Lankester's *Extinct Animals* (1905).

Arson (Old Fr. from Lat. *ardēre*, 'to burn'), in the criminal law of England, is a felony, described as the malicious and wilful burning of the house or building of another man. At common law, it was essential to the offence that the house or building burned should be that of *another;* but the common-law definition has been greatly widened by various statutes. Mere negligence will not support a charge of arson—there must be criminal intention. The matter is dealt with by the Criminal Law Consolidation Act of 1861, and various penalties of penal servitude and imprisonment are imposed. The statutory offence includes the setting fire to a house in the possession of the offender, if it be done with intent to defraud, and also the setting fire to growing woods or crops, or to a stack, a coal-mine, or a ship. To set fire to goods in a building is not arson unless the building catches fire, or unless the incendiary knew and disregarded the danger to the building. To cause explosions which are likely to endanger life or do serious injury to property is a felony. By special statutes for the protection of the public service, setting fire to ships of war, arsenals, government stores, &c., or the attempt to do so, is punishable by death.

In Scotland the technical term is *wilful fire-raising*. This is properly confined to setting fire to buildings, growing or stored corn, growing wood, or coal-heughs; but the common law extends to many minor offences, such as burning sheds, hay-stacks, and furniture. A man is of course entitled to burn his own property; but one of the most common offences is burning property with intent to defraud insurers. The tendency of the Scots law is to exact a wider criminal responsibility than in England for negligence in fire-raising, and for the indirect results of the offender's act. Until 1877 the statutory punishment of wilful fire-raising in Scotland was death, but penal servitude and imprisonment are now the sentences.

Ars-sur-Moselle (Ger. *Ars an der Mosel*), a town of Lorraine, on the river Moselle, 6 miles SW. of Metz by rail; pop. 5000.

Art. The category of art includes every object skilfully made or action skilfully performed by one or more persons for the purpose of giving pleasure to others by the emotion of beauty. The distinction between the arts and sports of action lies in this, that in the case of sport the action skilfully performed is done for the sake of giving pleasure to the doer. A work of art, therefore, implies, first, the birth in the mind of an individual, the artist, of an emotion or idea of beauty; secondly, the incorporation or execution of that idea in a work of art—that is to say, in material or visible form—either by his own hand or by the hands of others under his direction; and, thirdly, the existence of one or more persons then or thereafter capable of receiving from the work of art the emotion or idea of beauty which arose in the mind of the artist, and which he intended to convey. Thus every work of art stands as it were between two individuals, and depends upon both for its existence, the artist and the art-lover or person sensitive to beauty, but for this latter individual there is no name in the English language. We call him a connoisseur, or an art-

critic, or an art-amateur, but these designations are a mere makeshift for a missing word in our tongue. No work of art would ever be produced if the faculty of appreciating it did not exist in other persons. Moreover, the power which the public, or merely a small number of individuals, possess at a given date for appreciating a particular kind of art largely determines the kind of works of art produced by artists at that date. There is a continual action and reaction going on between artists and lovers of art which determines the character or style of art at any given date in any given place. As people vary from age to age, and likewise differ in different localities in the same age, the character of works of art varies likewise both in time and in geographical disposition. It follows that the only possible description of the art of the world is the history of art, which is the history of the mutations of the sense of beauty in mankind. We often hear people talk of the evolution of art as though far back at the beginnings of civilisation art had emerged in some rude form, and had thenceforward gradually, or more or less continuously, developed. Such, however, is by no means the case. Art does not evolve from age to age, but one school or kind of art succeeds another, and each may be supreme and unsurpassable in its kind. Particular schools of art evolve and decay, as, for instance, the school of Greek sculpture from, say, the 6th century B.C. to the 4th century A.D., between which limits it rose, flourished, and declined, its last stages being as feeble as its first. The history of art is a history not of an evolution, but of a succession. The earliest known works of art—paintings of the Stone Age on the walls of caverns—are as fine in their kind as the finest work of our own day is in its kind. We have not progressed at all in the fundamental quality which makes an object a work of art, nor will mankind ever progress in that respect.

From the definition with which we started it follows that the category of art and the category of morals are distinct. Art is not in itself either moral or immoral, good or bad. This is easily seen if we take a concrete instance. Any material may be employed by an artist to fashion into a work of art. Thus life itself may be so employed. A man who treats the raw material of his own life artistically, who learns to perform every action of life in an artistic manner, is called a 'gentleman.' A gentleman is an artist in living. It does not by any means follow that he is a good man. He may be a consummate blackguard. Conversely, a wholly good man may be no gentleman; and thus it is with any other category of art. A beautiful picture may be instinct with religious feeling or may be subservient to vice, art being alike independent of the one and the other. Only, a vicious kind of painting will be the work of vicious artists appealing to a vicious public, and therefore, for reasons entirely independent of art, such a school must of necessity be short-lived and, supported by a small coterie, doomed to rapid extinction. Art may be of a high or low type, and both alike good art. Thus cooking is an art, but even the best cooking is not art of a high type. No one would put the finest dish on a level with one of Beethoven's symphonies. Yet the one in its kind may be as good as the other in its kind, only the kinds are not equal. Again, a music-hall ditty that appeals to the groundlings is no less a work of art than the said symphony, only the creator that produced it and the public that appreciates it are of a lower order. The music-hall ditty, however, in its kind may be good, whilst a symphony in its kind may be bad; so that you may have a good work of art of a low sort and a bad work of art of a high sort, the words 'good' and 'bad' not being applicable to kinds, but only to qualities of works of art. A work of art is good of its kind when it avails to convey the idea of beauty from the creator to the recipient. The idea of beauty, high or low, must first exist. Granted that it exists in however low a form, the test of a work of art is its power of conveying that idea from the creator to the recipient. All men are not alike capable of receiving every idea of beauty or sensitive to every form of expression. No man is universally so gifted. Thus no artist addresses, or can be appreciated by, all mankind. Some appeal to a larger number than others without necessarily being thereby actually greater artists than those who appeal to a smaller number of persons of a superior human quality. Thus popularity is no test of the quality of an artist. Popularity only proves that at least a germ of true art exists in the thing admired. Every one knows, for instance, that the most popular novels at a given date are seldom, if ever, the best, but no novel attains large popularity which contains no artistic element. There must exist some quality of beauty in every really popular work. The large public admires what it is capable of discerning, and is necessarily blind to what it has no capacity of seeing.

It follows that art history is the only complete definition of art. All that has been actually made or done in the past for the purpose of giving delight is art. What the future may produce in that kind no one can foretell, but it also will be art, however foreign it may be to existing taste. Works of art may be divided into two large groups: those which exist for their own sake, and those which consist of objects of utility to which a form or covering of beauty has been intentionally added. Thus a knife with a carved handle is a work of decorative art, the carving being intentionally added solely for the purpose of giving pleasure. Works of expressive or creative art did not develop out of works of decorative art, as far as we can tell, but sprang into existence independently. The earliest of either sort known to us come from the latter part of the early Stone Age, twenty thousand years ago or more. Certain caves in Spain and southern France have in recent years been found to contain remarkable wall-paintings and modelled figures of animals now extinct, which are not so much accurate copies of the beasts as idealised representations of them, evidently drawn and coloured under the influence of emotion. Bones have also been found carved in about the same period or engraved with the likenesses of similar beasts. All these are works of creative art of a high order. Other bones have been found evidently shaped to be used as utensils, and at the same time decoratively shaped into animal forms. This late Palæolithic school of art stands alone as far as we at present know; but, of course, we cannot be sure that it was so, because they have only survived as by a miracle, whilst everything then and for thousands of years later made in perishable materials has naturally vanished. The Neolithic Age is more widely and variously represented, and decorated objects of many kinds have come down to us from it over widely scattered areas. Of its creative art we know nothing, but it does not follow that none existed. Neolithic culture was widely spread, and its traces have been discovered over all except the very north of Europe, all round the Mediterranean, up the Nile, and in many parts of Asia. During this period pottery was invented. In Egypt the neolithic people reached a high development, and formulated the type which Egyptian art afterwards followed. They wrought the hardest stones into polished vessels of beautiful form, they employed human and animal figures decoratively with skill, and they initiated the type

of Egyptian architecture. In Lower Mesopotamia a corresponding development went forward, though on a basis of clay instead of stone. In south Russia and the Danube district, with offshoots down the Balkan peninsula and across into Asia Minor, what is known as the Tripolje culture flourished. It has left some very remarkable pottery, whose decoration suggests a widespread influence exerted by it on some art-groups of the Bronze Age. The Ægean likewise and Syria were early centres of nascent civilisation, and other centres have been identified along the Mediterranean coasts and in west Europe. Towards the close of this epoch copper began to be used side by side with stone for utensils. This Copper or Æneolithic Age seems to have been relatively short, copper before long being replaced by the harder alloy, bronze. The Bronze Age produced remarkable schools of art in many parts of the world, from China in the Far East to Ireland in the West. It lasted roughly from about 3000 to 1500 B.C., beginning and ending sooner in some places than in others. The great schools of Ancient Egyptian, Chaldæan, Elamite, Hittite, and Minoan arts flourished during this period. At the beginning of this age building with great stones (megalithic architecture) was popular, and examples may be cited from the pyramids of Egypt in the East to Stonehenge in Britain, the Egyptian works being, of course, earlier. Egyptian art, though not in itself religious, had its forms and subjects largely directed by the religion of its time and place. The preservation of the body or the likeness of the dead was essential in the estimation of every Egyptian. Hence arose mummification; hence also portrait sculpture for burial, and monumental sculpture for display. It was likewise essential to preserve the aspect of the ordinary occupations of life, because, by the intervention of Osiris, such representations were believed to be made real for the souls of the dead. Hence the number of incidents of everyday life depicted on the walls of Egyptian tombs, often with great skill, especially in the rendering of animal forms, the traditions of the treatment of which may have descended from a remote antiquity. The monumental architecture of Egypt was likewise encouraged by the same desire for permanence. In its earliest known forms (the pyramids, mastabas, &c.), it was an architecture of the tomb. The quantity of the harder rocks readily available helped to determine the nature of Egyptian art. Chaldæa is a stoneless country. Its arts chiefly depended upon the nature of clay for their forms. The Chaldæans (proto-Babylonians) wrote upon clay tablets, which were afterwards baked. They built with bricks, chiefly sun-dried. They employed the potter's wheel at an early date, and they found out how to enamel. Some of their buildings were covered with enamelled bricks. They imported stone, which they sculptured well (the statues from Tello in the Louvre), treating it as a precious thing. They were great magicians, believers in the power of many spirits capable of being represented by natural objects—a belief at first not far removed from fetishism. They therefore studied the motions of the heavenly bodies; and their temples were solid staged towers of sun-dried brick, raised above the mists of the plains. They invented the forms of winged men and animals to represent certain demons and spirits; the figures of angels also come to us from Chaldæa. The dome was a Chaldæan invention. The wonderful discoveries made by Sir Arthur Evans at Knossos, supplementing the results of Dr Schliemann's excavations at Troy, Mycenæ, and Tiryns, have thrown a flood of light upon the Bronze-Age culture of the Ægean. It now appears that Crete was a centre of art-life contemporary with Ancient Egypt and Chaldæa, and having a style of its own no less remarkable than theirs. Cretan artists were influenced by, and in their turn influenced, the artists of Egypt. They produced beautiful examples of coloured pottery, works in the precious metals, painting, and small sculpture, and they exercised a widespread influence throughout the Mediterranean. In central and especially in northern Europe (Scandinavia) there were admirable craftsmen during the Bronze Age, and this was true as far off as Ireland. The development of the bronze spear out of the flint knife seems to have been accomplished in Britain. The sword grew out of the knife in the East.

When tools and weapons began to be made of iron, what is known as the Iron Age began. The transition from bronze to iron was gradual, and in Europe accompanied a considerable movement of the peoples. Most important was the coming down on to the Mediterranean region of hordes of less civilised peoples from the north. Achæans and presently Dorians overran the Ægean coasts and put an end to Minoan art. At this time the Assyrians rose to power. Italy also was invaded by a new population. The Hittite power, flourishing in the highlands of Asia Minor and the north of Syria in those days, and possessing a culture of its own, must likewise be remembered; whilst the Phœnicians, settled on the Syrian coasts, and borrowing indifferently the arts and crafts of Egypt and Assyria, were active as a sea-trading folk, who incidentally brought the artists of one country into contact with the products of another. The destruction of the old-established schools, and the introduction of an entirely new purchasing or employing public, resulted in the gradual development of altogether new styles of art, in which old traditions from all quarters were mingled together. Greece was the centre where eventually all rays of ancient arts were focussed, and where the art of the new world arose during the 6th century B.C., to attain its first culmination in the 5th century. Asiatic, Egyptian, and Minoan forms, revitalised by the spirit of the new peoples from the north, produced the art which in the hands of the Greeks was destined to dominate the civilised world for a thousand years. It was under the influence of the passionate struggle of Greece against the Persian hosts that the Hellenic ideal took final form. It may be called an Ideal of Reserve. In architecture and sculpture alike this ideal reigns, culminating in the age of Pericles. Gods are represented in perfect human shape, without exaggeration of form or posture, and with little expression beyond an aspect of benevolent calm and satisfaction. After the Peloponnesian war the purity of this ideal passed away. Sculpture tended to become theatrical or portrait-like, and portraiture became the leading art. In Italy the Villanova style of the early Iron Age gave way before that of the intrusive Etruscans, oriental in origin, much influenced by the Phœnicians, and presently wholly dominated by the Greeks, especially in those parts which were colonised by Greek settlements. After the conquest of Greece by Rome, Hellenic influence in art became supreme. Roman artists, in the time of the empire, developed in architecture a style founded upon that of the Greeks, with certain oriental elements added. The dome and the semi-dome were very much employed by Roman architects. Fresco and mosaic were likewise much used. Portrait sculpture flourished.

Whilst Greek art was waxing and flourishing in the West, a more or less independent school in Persia was expressing and developing the traditional style of Babylonia; and these two great schools, Eastern and Western, have continued their existence, with various actions and reactions

on one another, from that day to this. The conquests of Alexander the Great for a time brought these schools into intimate contact. Hellenistic art, especially architecture, borrowed a good deal from the East, whilst in Bactria and north-west India arts sprang up with a strong Greek infusion. This Greco-Indian or Gandhara School, as it is called, which took its subjects from Buddhism, was the foundation from which all later important Asiatic schools took their origin. Its offshoots have been revealed by Stein in central Asia, and away off to China; whilst in India the style had a continuous development unbroken down to the present day. Roman Imperial art was a form of Hellenistic, which for three or four centuries maintained itself supreme throughout the whole Roman Empire. It was not, however, in Rome or the West that it flourished best, but rather in the great Hellenistic cities of its origin—Alexandria, Damascus, Ctesiphon, and the cities of Asia Minor. Christianity for a long time had no effect upon the style of Roman art. Such works of art as the early Christians employed were in nowise different in style from that of their pagan contemporaries. Even the subjects chosen were adaptations of pagan subjects. When Constantine moved the capital of the Roman Empire to Byzantium, it was not Christianity which effected a change of style and the growth of the new Byzantine school, but it was the nearer proximity of the East and the influence of the contemporary and flourishing school of art in Sassanian Persia. Just as in the 5th century B.C. Greek and Achæmenian Persian art had flourished side by side, so in the 5th and 6th centuries A.D. Byzantine and Sassanian art blossomed together. At this time, however, a new school destined to a wonderful future was obscurely arising. To approach it lucidly we must for a moment retrace our steps. In the Bronze Age there had developed in Siberia and thereabouts a very prolific output of decorative art, of which the greatest number of existing remains are either in the museum of Minusinsk, near which place most were found, or in that of Petrograd. Objects in bronze of this style are found in a vast area from Lake Baikal in the east to the Dnieper in the west. The influence of the style is discoverable in bronze-work of the Danube basin and the Caucasus as well as in China. This is the ancient art of the Asiatic nomads, whose blood has fertilised the world, an art rude in its forms, but full of vigour and life. The Scythians, a branch of this great human horde, came in contact south of the Caspian with the Persians, and north of the Crimea with the Greeks. Works of art of fine quality made in gold have been found, of which some were the work of Persian, others of Greek, craftsmen. The Treasure of the Oxus in the British Museum represents the former; the latter are exemplified by the countless golden objects yielded by Crimean tombs to the Hermitage Collection at Petrograd, and only there to be studied. These date from a period ending towards the approach of the Christian era. In about the 3d century A.D. a new style of decoration applied to small objects of personal ornament is found arising in this region in and about the Crimea. It has been named the Bosporan style, and appears to have been employed by a mixed population in which Greek and Scythian elements were combined. Not far away dwelt for a time a Germanic population of Goths, who had wandered down from the Baltic region. They adopted this style of art and made it their own, if it was not actually they who invented it. The eruption of the Huns out of Asia in the middle of the 4th century A.D. set the Goths in motion westward, and inaugurated the period of the Barbarian invasions. The kind of art liked by the Goths commended itself also to the other barbarian tribes, and they carried it with them whithersoever they spread. As we know it, it was in the main an art of metal-work, especially goldsmithy, in which garnets, or, failing them, glass pastes, cut flat, were framed in gold or gilt cells or cloisons, or it consisted in covering the area of a bronze brooch or other small object with a decoration as elaborate as possible, in which beasts were often introduced, and in process of time so much contorted and elongated as to become a mere pattern of interlacing. Whether this kind of decoration was also applied to the embellishment of wooden architecture (which was the only architecture they used) we cannot say, but it is probable. The finest works of the kind were all of gold and jewels for personal ornament, the sort of art obviously best suited to an itinerant martial race who must take with them on their wanderings every precious possession they owned. In the 6th and 7th centuries this style of art flourished in every European country in which barbarian colonists had settled. In England it is Anglo-Saxon, in north France and Belgium Frankish, on the Rhine Frank or Allemanish, in south-west France and Spain Visigothic, in Italy Ostrogothic and Lombard. Only in Ireland and parts of England did the late Celtic forms of art maintain themselves, which had flourished there and in Gaul before the coming of the Romans, and even there the influence of the Teutonic beast-style was felt and to some extent amalgamated with the local style. Thus the school of Irish and Anglo-Saxon Celtic Christian art was formed, of which we shall have a word to say presently. All the barbarian schools were merely forms of the root school of the Gothic, and may be called Early Gothic together. They were not merely exercised by barbarian craftsmen, but equally, perhaps mainly, by east and west Roman craftsmen working for *nouveaux riches* barbarian princes and other employers. The tomb of Childeric (d. 481), father of Clovis, rendered up a characteristic group of the finest early works of the sort, quite possibly made at Constantinople, but in the barbarian style, to be given as a pleasing gift to a barbarian prince. In the 7th century, when more settled conditions had arisen, finer works of the kind were made, such as the wonderful Visigothic crowns of Guarrazar in the Cluny Museum. By this time the style had taken firm root, and was practised by such considerable artists as Saint Eloy, bishop and minister of Dagobert. Of course, it was not uninfluenced by classical Roman traditions, but it was always stronger than they, and maintained its individuality in spite of them, only annexing from them what it could completely assimilate. One of the great influences that operated to spread Christianity among the barbarians came from Ireland. Irish missionaries brought Irish art with them, and that style was well suited to mingle with and influence, as it did, the purely barbarian style of their pagan days. East and west Roman manuscript illuminations also greatly affected the early barbarian schools of script embellishment, there being no other tradition to set off against them; whilst, as the barbarians had no stone architecture of their own, they naturally borrowed whole-heartedly from Rome and the East in this kind. Only fragments of Merovingian and Visigothic buildings remain, yet they are very unlike Roman. It was in north Italy that the first vigorous school of stone architecture of a new type arose. Structurally it followed Roman traditions, but no one could confuse a Lombard church with an ancient Roman building. The style, once formed, grew rapidly and spread abroad. We call it Romanesque, but it is really a Lombard style that, taking root in north France, became Norman, and as Norman was brought over to England.

In the decorative details of Lombard buildings the forms of Early Gothic decoration as modified by the centuries are plainly visible. All through the 10th and 11th centuries it is still experimental, the great difficulty being to cover buildings over with a vaulted stone roof that would not fall in, and that could be adapted to whatever plan was required. It was in the process of solving this problem that what is universally known as Gothic architecture was invented, a kind of building in which the groined pointed stone vault determines the chief architectural features. This style emerged definitely in the latter part of the 12th century. It was, as we have seen, an ultimate outcome of the initiative first given to Europe in the 4th century by the invading Goths.

Meanwhile in the East a distinct art-development had been going on on lines of its own. When in the 7th century Islam sprang into being, and Moslem conquerors obtained possession of a vast territory, which presently reached from India northwards to Samarkand and west round the coast of the Mediterranean through Spain to the Pyrenees, this new style of art was supreme wherever the muezzin called to prayer. It was a style in which Sassanian, Egyptian, and Byzantine elements mingled. The craftsmen that handled it were largely Christian, but it was a new and truly Moslem style, for in all art, as in cooking, it is not the *chef* but the diner who determines the character of the *menu*. The centres of this art were the old centres in Persia, Mesopotamia, Syria, and Egypt. It cut itself off from many an old tradition by the prohibition (in orthodox districts) of the representation of the human form. All its strength was devoted to decoration, with the result that it produced in ceramics, glass, woven stuffs, plaster-work, carved ivory, &c. objects of a decorative splendour that have never been and can never be surpassed in their kind. When in the 13th century Gothic art was culminating in the north of Europe, Italy was in a relatively backward condition compared with France. The religious revival brought about by Francis of Assisi in the 13th century rapidly changed this state of things, and an intellectual revival followed. Fresco-painting improved under the hands of Cimabue, Giotto, and their followers at the end of the 13th and the beginning of the 14th century, who worked chiefly for Franciscan patrons. The Dominican revival soon succeeded, and then, in the 15th century, fine schools of art of all kinds flourished in various parts of Italy. The revival of classical study gave a new impetus to art. Ancient sculptures and buildings were studied and imitated, and about the commencement of the 16th century the culmination of this epoch of art was reached. Meantime, in the north of Europe, in the 15th century, painting had been cultivated with great success, whilst Gothic traditions were everywhere losing power. Under the influence of the mystic preachers a beautiful school of painting arose in the Rhine Valley in the 14th century, Meister Wilhelm and Meister Stephan of Cologne being its leading artists. At the beginning of the 15th century the centre of art-life in the North shifted to the Low Countries. There the Van Eycks made technical improvements in the method of painting, besides introducing the study of nature as the chief aim of their art. The Flemish school influenced all Germany, and generated the schools of Nuremberg, Augsburg, and other towns. When the classical revival spread north of the Alps Gothic art ceased, and the so-called Renaissance reigned everywhere.

The Reformation came, and for a time ruined the arts (with the exception of music) which had grown up in the service of the medieval church. In some parts of Europe the old traditions lingered on longer than elsewhere. Portraiture survived longer than other forms of art, and indeed culminated in excellence when ideal painting was already on the decline. The life of the 16th century was a life of action, and the art of action (*drama*) was naturally the one most cultivated. Painting, then, was succeeded by drama, the age of Raphael by that of Shakespeare. Splendid schools of painting, however, flourished in the Low Countries and Spain when the art was enfeebled everywhere else. Under the protection of drama music also developed, and may be thought to have culminated in our own day. In the 18th century there was another revival of painting, and schools of a new character arose in different countries. These schools have developed in different directions, and felt the influence of the contemporary literary and scientific movements which have gone on about them. The Romanticists of Germany and the Pre-Raphaelites of England were thus produced. They have been followed by Impressionists, Post-Impressionists, Futurists, *et hoc genus omne*, about all of whom the future must judge.

The English style of painting was practically founded by Van Dyck in the reign of Charles I. He was succeeded by Sir Peter Lely, and he in turn by Sir Godfrey Kneller. Richardson, Hudson, and other mediocre painters followed, the mass of their work consisting of portraits. In the 18th century a revival was effected by Hogarth, Reynolds, and Gainsborough. Wilson painted landscapes in the classical style; Gainsborough introduced into the rendering of landscape a broader treatment of country scenes. Turner's art was primarily founded upon the classical style, but he united with that a direct appeal to nature, and by unbounded study he attained a skill of handling and a minute knowledge of nature in every mood such as has never before or since been attained. Constable carried on the traditions of Gainsborough, and strongly influenced the landscape-painters of France. The decline of landscape art in the present day is marked by increasing triviality on the one hand, and slovenliness on the other. There can be little doubt that the invention of photography, with its later developments of process-reproduction and of living pictures shown by the cinematograph, has had a great influence upon contemporary art. When pictures were rare they were prized. Now we are overwhelmed by coloured reproductions of all the famous paintings in the world. We are thus liable to be sickened by too much sweetness. Moreover, when the only representations of living creatures that were to be had were drawings, paintings, sculptures, and so forth made by the hand of man, there was an element of marvel about any picture. Now photography has made the likeness of living things utterly common. Cheap newspapers are full of them. They are poured upon us by advertisers. We see pictures everywhere. The poorest can have almost as many as he pleases. They are no longer precious, and there is nothing surprising about any of them unless they are badly drawn, for the cheapest photograph draws correctly. Moreover, no picture can for a moment compete with the cinematograph as an agent for representation of actual facts about living people. We can still see Edward VII. walking, talking, smiling, far more vividly than any painter could ever have presented him. Thus the public is tired of pictures that correctly represent facts, and is indeed probably tired of any and every possible kind of picture. Hence the coming of post-impressionist art, which is bound to devote itself to decoration rather than merely to the painting of pictures which no one has wall-space left to hang. But if the days of painting are perhaps for the time over, the day of decoration

has returned, and we may expect the future to produce decorative arts which we hope in their kind may rival the finest that Sassanian, Byzantine, or Moslem artists ever imagined.

The impulse to decorate a useful object is one common to all mankind. It is merely to continue a little further the labour of simple manufacture. With this instinct is involved the equally natural impulse which drives men to imitate the objects seen about them, by which they are chiefly interested. Landscape-painting, for example, is suggested by the desire to fix upon some portable surface the image of a view which pleases or interests the draughtsman. But out of this effort at imitation arises a new desire—that of creation. The artist is not satisfied merely with attempting to copy what he sees. The study of nature fills his mind with thoughts of beauty; he conceives persons and scenes which he has never beheld, and the impulse arises in him to give visible form to such conceptions, to transfer the idea from his own mind to that of another. Works produced in this spirit are new creations, and take rank as the highest form of art. Their excellence is determined by a twofold test. Is the thought itself fine? has it been duly expressed? In the works of early schools of art we often meet with the finest thoughts expressed by very undeveloped means, and yet completely. In works of a declining school the expressive power of the artists is generally great, but their thought feeble or mean. Complete powers of expression, themselves beautiful, and fullness of lovely and ennobling thought, are the marks of a culminating school. Every school of art arises in the wake of some new ideal which it endeavours to express. Some ideals are best expressed in monumental buildings, like the ideal of Persistence of the Egyptians. The Greek ideal of Reserve found its clearest expression in perfect sculpture. Each ideal exercises a formative power, and directs at once the desires and the hands of men. It wins for itself, step by step, clearer and nobler expression, and enjoys a brief time of perfect life. Then a decadence sets in, and after a longer or shorter period of transition or barrenness, another ideal arises to produce a new art. Such a transition can best be watched taking place in the 15th century, between the medieval ideal, which produced chivalry, feudalism, and Gothic architecture, and the Renaissance ideal, which produced the study of antiquity, the revival of learning, a tendency towards despotism in government, and the great schools of painting in Germany, Italy, the Low Countries, and Spain. It follows from this, that in every epoch there is one dominant art to which the rest are subsidiary. In the 13th century architecture ruled. Painting and all the minor arts derived their forms from those developed in the service of architecture. The very binding of books was decorated with bas-reliefs. Ivory carvings were like little buildings.

It is impossible to draw a sharp line of division between fine and decorative art. Sculpture primarily intended to decorate a building may be (as in the case of Notre Dame at Paris) amongst the finest, considered as pure sculpture. In a time of artistic culmination, almost everything that is made is endowed with somewhat of the splendour of the supreme art. Nevertheless, one law can be stated to which all art, primarily decorative, must conform. Decoration must not interfere with the utility of the object decorated, but must rather express, or at all events be conformable (in spirit as in shape) to, that utility. Giving to this same principle a wider application, we may deduce from it the law, applicable to all art whatsoever, that the material in which a work of art is executed must to some extent govern the style of the work. There is one style suitable for sculpture in granite, another for sculpture in marble, another for metal, another for wood. A figure rightly carved in the one substance would be wrong if copied into another. Again, the process of working has also to be taken into consideration in the design. A cartoon for a painting would not be suitable for translation into a stained-glass window, a tapestry, or a mosaic. In line-engraving, the lines are ploughed into a copperplate by the direct application of the strength of the engraver's arm. In etching, the copperplate is first covered with varnish, and then the varnish is scratched off in fine lines by the point of a needle. The lines are afterwards bitten in by the chemical action of an acid. The artist's hand acts in the one case deliberately and with force, in the other swiftly and lightly. What, therefore, is suitable treatment in line-engraving is unsuitable in etching, and *vice versâ*. In pen-and-ink drawing, the pen lays black lines on a white surface. In wood-engraving, the white spaces are cut out, and what is to print black is left standing in relief. A good pen-and-ink drawing, therefore, will make a bad woodcut.

All the decorative and many of the creative arts may likewise be considered as 'glorified handicrafts.' As long as an object is only intended for use, it is not a work of art. An object made purely for use may indeed be beautiful. If, like a ship or a water-wheel, it is made to be as it were used by the forces of nature, its forms are then as much dictated by the action of the forces of nature as the forms of a cloud or a hill, and it shares the beauty of all natural objects; but it is not a work of art. It is only when the workman goes beyond what is necessary for use, and consciously aims at giving also pleasure by his work, that he becomes an artist. Weaving is not an art, but tapestry-making is; it is the glorified handicraft of weaving.

Much has been written about the artistic or inartistic nature of certain peoples. Thus the ancient Greeks are considered an artistic race, the Romans inartistic. In all probability there is an artistic potentiality in every people. The ideal of the Greeks was representable, and their circumstances were at the time favourable to its representation. The Romans were chiefly employed in the government and administration of a large empire. Their ideal was not representable, and their energies were fully occupied in developing it in other than artistic directions. It is not the natural gifts so much as the condition and circumstances of a people at a given date that determine whether it shall be artistic or not. The French in the 13th century were the most artistic people in Europe. In the 15th century the French produced relatively little of supreme excellence, whilst the Italians had in the meantime gone to the front. Art is primarily an expression of happiness, and a product of passion in leisure. When the passions of a race are fully occupied in the business or troubles of life, art languishes. It grows strong when a strong race is enabled by circumstances to devote its strength to joy. The passion of life in the present day is chiefly enlisted in scientific discovery. Art, therefore, is not the first thing in the life of any existing nation, and no supremely great school is at present culminating.

ART INSTRUCTION has to secure the power of outlining correctly in pencil from a copy, and after this has been attained, the pupil proceeds to add light and shade to his previous work in outline. The next step is to draw—or, if a sculptor is being trained, to model in clay—from the object itself, and for this purpose plaster casts of fruit, flowers, and leafage, and afterwards casts of statues, form the most convenient models. When sufficient power has been gained by these exercises, the pupil enters

the life-school, and works from the draped and the undraped human figure; if a sculptor, modelling the subject in clay; if a painter, rendering it in light and shade, and afterwards in colour. On leaving the life-class he is free to choose his own special department of art, but for the landscape-painter, and even for the decorative designer, as for the sculptor and the figure-painter, the fittest preparation and the most searching training lies in study from the human figure, though the latter require a knowledge of anatomy which is unnecessary in the case of the former. The training of the painter includes instruction in the various technical processes of oil and water-colour painting, as that of the sculptor includes instruction in the qualities and capabilities of the marble and other materials with which he works; while the architect requires a wider scientific knowledge, and a full acquaintance with the laws of mechanical construction.

In the early times of art the painter or sculptor was trained like any other craftsman. He entered the studio of some recognised practitioner of the art to which he meant to devote himself; and began, if under a painter, to prepare colours and to ground canvases, learning all that his master had to teach him; and finally he took part in the production of the monumental frescoes and even of the easel-pictures which were given to the public under the master's name. Gradually, however, the fine arts began to separate themselves more sharply from the other crafts. Their professors assumed a higher status than formerly. It became more and more the custom that an artist should finish with his own hand every portion of each work which issued from his studio. Academies of art were formed, and, in connection with them, art training was conducted by certified instructors. Thus a class of art-teachers, as distinct from art ists, arose, a change not altogether favourable in its influence upon the future of art.

In England, one of the first efforts in the direction of systematic art training was made by Sir Godfrey Kneller, who in 1711 founded an institution for giving professional instruction in design. In 1724 Sir James Thornhill established a similar academy in his own residence; but several students seceded from his class, headed by John Vanderbank, who started a short-lived academy, in which study from the life was introduced. This was followed by the well-known St Martin's Lane Academy, founded by William Shipley, where for thirty years those who afterwards became the leading artists of the time received their training. It was superseded by the schools instituted by the Royal Academy after its foundation in 1768.

The establishment of the South Kensington Department of Science and Art marks an important epoch in the history of art instruction in England. It may be said to have arisen out of the report of a select committee of the House of Commons appointed in 1835 'to inquire into the best means of extending a knowledge of the arts and principles of design among the people (especially the manufacturing population) of the country.' On the recommendation of this committee a sum of £1500 was devoted to the establishment of a Normal School of Design, with a museum and lectures. The school was opened in 1837, and by 1851–52 the government grant for this school and its various branches throughout the country had attained the amount of £15,055. In 1852, in accordance with a report of a select committee, the scheme was reconstructed, and a 'Department of Practical Art' created, with Sir Henry Cole, K.C.B., as superintendent; and a Science Department was added in 1853. It was under the management of the Board of Trade till 1856, when it passed under the control of the Lord President and the Vice-president of Council on Education. The Department of Science and Art was united with the Education Department to form the Board of Education in 1899, and the Royal College of Art was reorganised. The South Kensington Museum, founded in 1851, has played an important part in the art education of the country, and perhaps entirely for good. See *South Kensington and its Art Training*, by Frank P. Brown, A.R.C.A. (1912).

In 1869 a great stimulus to art education was given by the foundation, through the bequest of £45,000 by Felix Slade, of the 'Slade Art Professorships' in the universities of Oxford, Cambridge, and London. These chairs have been held by Ruskin and other persons of the highest eminence.

In Scotland a remarkable effort in the direction of art instruction was made by Robert Foulis, the well-known printer. In 1751 he visited the Continent, engaged drawing-masters, and purchased pictures, casts, and engravings; and on his return to Glasgow in 1753 he started a school of art. The classes were continued till about 1776, and were far from a pecuniary success; but they afforded training to such excellent artists as David Allan and James Tassie, and exercised a most important and beneficial influence upon Scottish art. In 1760 the Board of Manufactures in Scotland founded a school of art in Edinburgh which, under the name of 'The Trustees' Academy,' afforded instruction to almost every Scottish painter of distinction for a century and a half. In 1858 this school was affiliated with the South Kensington Science and Art Department. Its functions, and those of other schools, were taken over by the Edinburgh College of Art, founded by the Town Council in 1908 to teach painting, sculpture, architecture, and design. In 1880 art instruction was brought within the scope of the Scottish university curriculum by the establishment of the Watson-Gordon chair of Fine Art in the University of Edinburgh, in memory of Sir John Watson-Gordon, P.R.S.A., through the bequest of a sum of about £12,000 by his brother and sister.

In Ireland there are classes in connection with the Royal Hibernian Academy for study from the antique and the life; and the Dublin Metropolitan School of Art is under the Department of Agriculture and Technical Instruction.

Various Continental schools, especially those of Munich and Antwerp, have attained celebrity; but Paris is now the great centre of art instruction, in which many British and American students have been trained. Since the time of J. L. David—who, when in exile, also influenced the school of Belgium—the French have been celebrated for their command over form; and, in recent years, their power as colourists has greatly increased. The Parisian method of study is admirably adapted for giving its pupils a certain technical dexterity. The *Prix de Rome* of the French Academy is a much-coveted distinction, ensuring a residence for study in the Villa Medici, Rome.

See Æsthetics, Anthropology, Architecture, Engraving, Impressionism, Painting, Sculpture, &c.; and for the other fine arts such articles as Music, Drama, Poetry.

Arta (Turkish *Narda*, the ancient *Ambracia*), capital of a division of Epirus, ceded to Greece by Turkey in 1881 (area, 700 sq. m.; pop. 50,000). The town stands on the left bank of the river Arta (the ancient *Arachthus*), 8 miles from its mouth in the Gulf of Arta (the ancient *Ambracian Gulf*), an arm of the Ionian Sea. It is the see of a Greek archbishop, and has a considerable trade. It was on the Turkish frontier till 1912–13. Pop. 10,000, of whom more than two-thirds are Greeks.

Artabaz'us, the name of several distinguished Persians under the dynasty of the Achæmenidæ. When Xerxes advanced against Greece, an Artabazus led the Parthians and Chorasmians. At a later period he warned Mardonius, but in vain, against engaging in battle at Platæa; and on his defeat fled with 40,000 men, and reached Asia in safety.—Another Artabazus was general under Artaxerxes II., revolted against Artaxerxes III., but was forgiven, and served Darius faithfully.

Artagnan, COUNT D' (1612–72), prototype of Dumas's hero of the *Trois Mousquetaires* cycle, a Gascon who, under the Duc de Nemours, commanded the Royal Guards, arrested Fouquet, and fell at the siege of Maastricht. See his Memoirs (translated by Nevill, 1899–1900).

Art and Part. See ACCESSARY.

Artaxerx'es (ancient Persian *Artakhshathra*), the name of several Persian kings. (1) ARTAXERXES I., surnamed *Longimanus* ('long-handed,' no doubt from his wide-reaching power), the second son of Xerxes, after the conspiracy of Artabanus, which caused the death of the king, put to death his elder brother, and ascended the throne in 465 B.C. His long reign, extending for forty years, was marked by a decline of power.—(2) ARTAXERXES II., surnamed *Mnemon* ('the mindful'), succeeded his father, Darius II., in 404 B.C. After the death of his rebellious brother Cyrus in the battle at Cunaxa, he became involved in war with Sparta, which ended with the peace of Antalcidas. He died in 359.—(3) ARTAXERXES III., named *Ochus*, was the son and successor of the preceding. He found the empire falling to pieces, but did much to build it up again, and stave off the coming ruin. After putting down the revolts of Artabazus and Orontes, he subdued Phœnicia and Egypt, and reduced Cyprus. He mainly owed the conquest of Egypt to his general, Mentor, and him he rewarded with the satrapy of the west coast of Asia Minor. He outraged the religion of the Egyptians by desecrating their temples and slaughtering their sacred animals. He was poisoned in 338 by his favourite eunuch, Bagoas.—(4) ARTAXERXES, or Ardeshir, the founder of the new Persian dynasty of the Sassanidæ, overthrew Ardaván (Artabanus), the last of the Parthian kings, and was hailed as 'king of kings' on the battlefield in 226 A.D. He next conquered Media and a large part of the Iranian highlands, but had less success in Armenia, and was defeated by Alexander Severus in a great battle in 233. He made most of the former vassal states of the Arsacidæ into provinces of an empire, which he consolidated so well that it endured for four hundred years. He died in 242.

Artedi, PETER, a celebrated Swedish naturalist, was born in 1705. He studied for the church at Uppsala, but soon betook himself to the natural sciences, having Linnæus for fellow-student and friend. He became specially distinguished in ichthyology; and having gone to England in 1734, he there completed his great work, the *Ichthyologia*, the first which gave a truly scientific character to the study of fishes. He was also a distinguished botanist. He went to Leyden in 1735, and in the same year was drowned in a canal near Amsterdam.

Ar'temis, a goddess of Greek Mythology, daughter of Zeus and Leto, twin-sister of Apollo, born with him in Delos, whence she is often called *Ortygia* from the ancient name of the island, or *Cynthia* from Mount Cynthus there. To the Greeks she was (1) a kind of feminine Apollo, armed like him with the bow, dealing plagues and death to beasts and men, but also healing diseases and averting evils. She has a special care over the young of animals, and is therefore the goddess of the flocks and the chase. Her heart has never yielded to love. She slew Orion for an attempted insult, and changed Actæon into a stag simply because he had seen her bathing. As the sister of Apollo, regarded as identical with Helios ('the sun'), she came to be regarded as the goddess of the moon, corresponding to Selene, and latterly the worship of the two was amalgamated. (2) The Arcadian Artemis is merely a goddess of the nymphs, hunting together with them on the Arcadian mountains, drawn in a car by four stags with golden antlers. (3) In Attica and Sparta the goddess was worshipped under a somewhat sterner aspect, and the usages point back to original human sacrifices. According to tradition, Iphigenia, who had herself been about to be sacrificed to the goddess, brought her image from Tauris and set it up at Brauron in Attica, whence *Brauronia* became a name of Artemis. At Sparta boys were scourged at her altar until it was sprinkled with their blood. (4) The goddess worshipped as Artemis at Ephesus was originally, according to Hogarth, an archaic Greek type of woman; the many-breasted figure was a late Hellenistic importation or invention (according to the result of excavations at Ephesus). Frazer insists that Artemis was nowhere a chaste vestal, but typified the fecund forces of nature, and was even associated with child-bearing. See Acts xix. With Artemis several local goddesses seem to have been fused, as Britomartis, Aphaia, Dictynna.

By the Romans Artemis was identified with the ancient Italian divinity Diana. The attributes proper to Artemis were attached to her name.

In art Artemis is represented as a young and handsome huntress, her hair tied up around her head, modestly clothed in the chlamys, but with the legs bare below the knees. She carries the bow and quiver of arrows, and is attended by dogs or stags. As the moon-goddess, again, she is clothed in a long robe, her head covered by a veil, above her brow the crescent of the moon. Her most famous statue is the 'Diana of Versailles,' found in Hadrian's villa near Tivoli, now in the Louvre.

See ASTARTE, DIANA, NEMI; Claus, *De Dianæ antiquissima apud Græcos natura* (1881); Schreiber's 'Artemis' in Roscher's *Lexikon der Mythologie* (1884–1905); Frazer, *The Golden Bough* and the *Fortnightly*, Dec. 1904; and Hogarth's *Excavations at Ephesus* (1908).

Artemis'ia, queen of Caria from 352 to 350 B.C., was the sister and wife of Mausolus, and is celebrated for the magnificent mausoleum which she caused to be erected to her husband's memory (see MAUSOLEUM).—Another Artemisia, queen of Halicarnassus, accompanied Xerxes, with five ships, in his expedition against Greece, and distinguished herself at the battle of Salamis (480 B.C.); she ended her life, in consequence of an unfortunate attachment, by leaping from a rock.

Artemisia. See WORMWOOD, SAGEBRUSH.

Artemovsk. See BAKHMUT.

Ar'teries (Gr. *artēria*, probably from *airein*, 'to raise,' but by some connected with *aēr*, 'air,' from the old idea that these tubes were air-carriers, since after death they are generally found empty), the vessels through which the blood passes *from* the heart to the tissues. The structure of an arterial tube is very complex, and a section of it may be roughly subdivided into three layers, called the coats of the artery: an external, consisting of interlacing bundles of fibrous tissue mixed with elastic fibres, which in large vessels such as the aorta are gathered together to form an elastic layer; a middle, which is muscular, contractile, and brittle, the fibres being arranged in a circular

direction; an internal, also brittle, the free surface being smooth and formed of a single layer of endothelial cells. External to these cells there is a layer of delicate connective tissue, outside which there is the elastic layer constituting the bulk of the inner coat, and distinguished by numerous perforations, causing its fenestrated appearance. The tube is also enveloped in cellular tissue, termed the *sheath* of the artery. When an

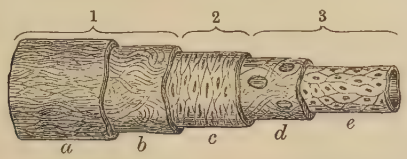


Diagram of the Structure of an Artery (after Turner):

1. External coat { *a*, fibrous. *b*, elastic.
2. Middle coat *c*, muscular.
3. Internal coat { *d*, elastic. *e*, endothelial.

artery is wounded by a sharp instrument, the effect varies with the direction of the cut. Thus, if longitudinal, the edges may not separate, and the wound may heal without much bleeding; if oblique or transverse, the edges gape; and a nearly circular orifice allows of a profuse hemorrhage. If the artery be completely divided, its walls do not collapse like those of a vein, but pass through certain changes provided by nature to prevent fatal bleeding. The cut orifice contracts, and also retracts into its cellular sheath; this checks the flow of blood, a clot of which shortly forms on the outer side; then another forms inside the vessel; and together, they stem the flow, till the cut edges of the artery have time to throw out lymph (see ADHESION), and heal as wounds of other tissues. When an artery is compressed by a ligature, the brittle inner and middle coats crack and curl inwards. The interior of the vessel becomes filled with a clot which extends as far as the nearest collateral branch. Gradually the clot is absorbed and fibrous tissue deposited in its place, the result being that this part of the artery is entirely obliterated. See BLEEDING.

The arteries of the human body consist of two groups—those belonging to the lesser or pulmonic circulation, and those belonging to the greater or systemic circulation. All the offsets of the latter group are branches, more or less direct, of the aorta. As each main trunk passes into a portion of the body, it divides into two principal divisions: one, which breaks up into branches for the supply of the tissues in the vicinity—the artery of *supply;* and another, which passes almost branchless to supply the parts beyond—the artery of *transmission.* These, however, anastomose freely (see ANASTOMOSIS), so that the distant tissues are not solely dependent for their supply on only one arterial trunk. Thus the femoral artery divides in the groin into the profunda or *deep* femoral, to supply the thigh, and the *superficial* femoral, to supply the leg below the knee. Again, the common carotid divides into the *external* carotid, to supply the neck and head, and the *internal* carotid, to supply the brain. Although arteries have generally the same distribution or arrangement of branches, they frequently vary, and thereby are apt to puzzle a superficial anatomist. Some of the varieties are so common that it becomes difficult to decide which is normal. These peculiarities are often found as constant forms among lower animals, but in many cases they may be due simply to enlargement or diminution of vessels already existing. The principal arteries will be considered under their distinctive names, as at Aorta (q.v.); and see CIRCULATION, BLOOD, HEART, VEIN.

DISEASES OF ARTERIES.—Arteries, like other organs of the body, are liable to acute inflammation (Arteritis); but this rarely occurs except as a consequence of inflammation in the neighbourhood of the vessel, or of obstruction of its tube (see below). By far the most common and important disease affecting arteries is Atheroma (from Gr. *athērē*, meal). Atheroma is commonly a disease of advanced life, but may be found at any age. Its occurrence is favoured by any cause which produces greatly increased arterial pressure (occupations or amusements involving very great physical exertion, excessive use of alcohol), probably also by syphilis. It commences with a chronic inflammation, with greatly increased formation of cells in the outer layers of the inner coat of the arteries, perhaps also in the middle coat. This infiltration causes destruction of the natural tissues of these coats, and consequent loss of elasticity and contractility in the parts of the artery affected. The inflamed portions of tissue undergo fatty degeneration, and may either (*a*) become so softened as to be carried away by the blood-stream, or, more commonly, (*b*) become gradually calcified—i.e. converted into bony plates by the deposition in them of chalky matter. (*a*) A portion of the wall of an artery weakened in this way rarely becomes perforated, but frequently yields to the blood-pressure, becomes dilated, and forms an *Aneurism* (q.v.). (*b*) Calcification is much commoner, especially in old people, and may frequently be recognised in the superficial arteries by the hard feel the vessel has under the finger.

Atheromatous deposit is at first attended with a narrowing of the calibre of the vessel, varying with the thickness of the deposit, and most marked at the points of bifurcation. Smaller arteries may be completely obliterated, whilst the larger arteries may be very much contracted. Thus the common iliac has been found to have its canal diminished by about one-half, and the great ascending branches of the arch of the aorta, the subclavian and carotid arteries, have been found very nearly closed. A later consequence of the same disease is dilatation of the vessel. The elasticity of the outer coats being insufficient to contract the artery after the distension produced by each contraction of the left ventricle of the heart, it remains distended during the relaxation of the ventricle, and thus slowly expands; the enlargement being most marked at parts where there is most obstruction to the blood-current, as, for example, in curved arteries. These changes have also an effect on the retractile power of the arteries. A healthy artery, if cut across, may shorten to the extent of an inch or more; but the retractile power is destroyed by the deposition of bony rings or plates. But although incapable of shortening, the arteries sometimes become abnormally lengthened, and consequently become not only dilated, but also tortuous. All these changes produce great interference with the normal circulation of the parts whose arteries are affected; and where the disease is advanced, a cause that would otherwise be trivial may lead to serious results—e.g. softening of the brain, gangrene of the limbs, &c.

Another condition involving much danger is this: an ossified artery loses the smoothness which the interior of the vessel ought to present, and from the displacement or cracking of a bony plate, there may be sharp rough projections exposed, to which the fibrin of the circulating blood may adhere. These little clots becoming detached, may be carried with the blood till they become arrested, and plug up an artery, thus presenting cases of embolism or Thrombosis (q.v.). Again,

the relation of this disease to accidents and surgical operations on arteries is obvious. A blow or strain may rupture a diseased artery, when a healthy elastic vessel might have escaped injury. Such a slight movement as suddenly lifting the arm to the head, for the purpose of securing the hat in a sharp gale, has been known to be followed by aneurism of the axillary artery (Syme). A ligature applied to any calcified artery is very apt to cause it to break, and the difficulty of securing such vessels is often very great. It is to this form of disease that most of the failures of operations for aneurism are due.

Atheroma can be detected in the living subject only in its advanced stages, and its presence is often revealed by the occurrence of some secondary disease or symptom.

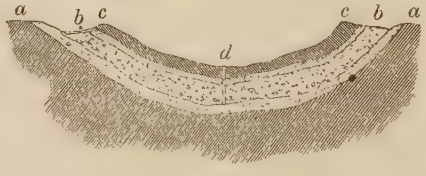
Another form of chronic inflammation of the arteries is met with in syphilis. It consists in a uniform thickening of the inner coat of the vessel, without the degenerative changes of atheroma, but with great diminution of its calibre, and consequent interference with the circulation. It is best seen and most important in the brain, where it often leads to softening.

Embolism is the name given to the obstruction of an artery by a plug carried to it from another part of the body. This may follow atheroma (see above), but is most commonly a consequence of the detachment of a mass of fibrin from a diseased heart. Any artery may be obstructed by embolism; the consequences are most serious in the brain, the retina, and the limbs. In the larger arteries of the brain, embolism causes symptoms and results very similar to Apoplexy (q.v.); in the retina, it causes sudden and often complete loss of vision (see EYE).

When the principal artery of one of the limbs is 'suddenly plugged in its higher part, a sensation of severe pain is commonly the immediate result of the accident. In some cases, the pain extends along the course of the vessel, which, though pulseless, is extremely tender; in others, the suffering is referred to some distant part of the limb, as, for instance, to the calf. Signs of a deficient circulation succeed, and they may amount to pallor, loss of temperature, numbness of the surface, or even to that torpor which is observed to precede the total death of a limb in certain cases of injuries of vessels.' Although Gangrene (q.v.) is always to be feared as the result of an obstructed artery of large size, it does not invariably follow; as a collateral circulation may be established, and the life of the limb may be thus saved. Very young persons will endure the obliteration of very large vessels without gangrene; and a case is on record in which 'all the main arteries of both upper extremities and of the left side of the neck were reduced to solid cords,' and yet no gangrene ensued. From the description of the symptoms, the nature of a case of sudden occlusion of a large artery by a plug may possibly be recognised, or at all events suspected, even by a non-professional observer. Medical aid must at once be sought. The early indications of treatment are to preserve the temperature of the part, to favour the establishment of a collateral circulation, to protect the limb from irritation or injury, to give nourishing blood-making food, and to relieve pain by the judicious use of opiates. The later treatment, if the affection is not checked, is that which is described in GANGRENE.

Arteriot'omy, or the opening of an artery, is an operation that has been strongly advocated in those cases in which it is desirable to produce a more decided and immediate depletion of the brain circulation (as in severe forms of bleeding on the brain) than could be produced by ordinary venesection. It is supposed by some surgeons to relieve pressure on the brain more efficiently than opening the jugular vein could do; and whether this is the case or not, it is a simpler and less dangerous operation. The only vessel operated on is either the temporal artery itself or one of its main branches, which is partially divided and allowed to bleed. The operation is a simple one, but should of course only be undertaken by a surgeon. To arrest the flow of blood when sufficient has been taken, the artery should be completely divided to allow its cut ends to retract; and after the surrounding parts have been sponged, a small antiseptic pad should be applied to the wound, and secured by a bandage, which must be carefully adjusted, so as, if possible, to remain undisturbed for four or five days, when it may be removed, and the wound covered with a strip of adhesive plaster.

Artesian Wells are perpendicular borings into the ground, through which water rises from various depths, according to circumstances, above the surface of the soil. The possibility of obtaining water in this way in a particular district depends on its geological structure. All rocks contain more or less water. Arenaceous rocks receive water mechanically, and according to their compactness and purity, part with a larger or smaller proportion of it. A cubic yard of pure sea-sand can contain about one-third of its bulk of water. It would part with nearly the whole of this into a well sunk in it, and regularly pumped from. Chalk and other rocks, composed of fine particles, closely compacted together, contain as large a proportion of water; but from the power of capillary attraction, little or none of this water would be drained into a well sunk in such rock. From the existence, however, of numerous crevices in chalk through which the water freely flows, and from the general presence of a larger quantity of water than the porous rock is able to retain, wells sunk in chalk often yield water. There is yet a third class of rocks, which are perfectly impervious to water; such are clays, which are strongly retentive, neither allowing water to be obtained from them nor to pass through them. When such rocks occur in a Basin (q.v.) in alternating layers, and in such order that pervious beds are inserted between impervious ones, it is evident that if a perforation is made through the retentive barrier-bed in the lower portion of the basin, the water contained in the water-logged strata will rise through the bore to a height depending upon the pressure of water which has accumulated in the confined sloping space between the two impervious beds. The explanation will be more evident by a reference to the accompanying figure, which may be considered as a diagrammatic section of the London



Section of the London Basin.

basin. There are here a number of porous beds, *b*, *b*, composing the chalk formation, resting on the impervious gault, *aa*, and these, again, are covered by the equally impervious series of the London clay, *cc*, which form the strata on the surface, and extend to a considerable depth. The edges of the chalk-beds are largely exposed in the higher grounds around London; the water falling on the

whole area of these exposed edges sinks into the more or less porous chalk formation, and would in course of time, by continued accessions, fill up the basin were it not prevented by the clay above. By driving a bore, *d*, through this superior bed the inferior water-logged strata are reached, and the subterranean water rises to the surface, and flows continuously, by means of hydrostatic pressure.

Many such wells exist in London and its vicinity; those which, since 1844, have supplied the ornamental fountains in Trafalgar Square descend into the upper chalk to a depth of 393 feet. The most famous artesian well perhaps is that of Grenelle, near Paris, which was bored in 1833-41, and whose water is brought from the gault at a depth of 1798 feet. It yielded at first 700,000 gallons a day, the water rising 122 feet above the surface; temperature, 81·7° F. Its present yield is 70,000 gallons—the water now rising only 32 feet. An artesian well bored at Pesth in 1868-79 yields, at a depth of 3182 feet, water of a temperature of 165° F. In the United States numerous artesian wells have been sunk, some of great depth, among which are two in St Louis, Missouri, 2197 and 3843½ feet deep respectively; one in Louisville, Kentucky, 2086 feet; one in Columbus, Ohio, 2775½ feet; one in Pittsburg, 4625 feet, with many others from 500 to 2000 feet.

The Chinese and Egyptians were early acquainted with artesian wells. The oldest known in Europe is at Lillers, in Artois (hence the name *Artesian*), and was sunk in 1126. They have been in use for centuries in Austria, especially in the neighbourhood of Vienna, where formerly the boring for them was conducted in a rude and empirical manner. As soon as geology took the position of a science, and the theory of artesian wells was propounded, the engineer was able, after the geological survey of a district, to discover whether a supply of water could there be obtained in this way. Already districts formerly dry and arid have received a plentiful supply of water by means of such wells, and many more applications have yet to be made. Artesian borings have been executed in the Sahara from remote antiquity, and new ones have been opened by the French in the Algerian Sahara with remarkable success, and great benefit to the country and the nomad Arabs, who settle down round the wells. In the drier regions of Australia the supply of water from artesian bores is of great and increasing importance. The most important basin, about 569,000 sq. m. in area, extends under the northern half of the Australian alluvial plain, and is bounded on the east by the Dividing Range (along whose western foothills the intake beds outcrop over 60,000 sq. m.), on the south by the Bogan and Darling Rivers and lat. 31° S., and on the west by the Great Western Tableland (see AUSTRALIA, *Physical Features*). Its main outlet seems to be to the Gulf of Carpentaria, but a minor outlet is indicated by the existence of numerous 'mound springs' in Central Australia. Professor Gregory (*The Dead Heart of Australia*, 1906) regards the water contained in this basin as largely of plutonic origin, a temporary accumulation which may be soon exhausted; but the general opinion of scientific observers in Australia itself favours a meteoric origin, and attributes the undoubted slackening of the supply in some bores to the corrosive action of the water on the impure iron of the pipes. The whole question is still under investigation. Seventy-five per cent. of the flowing bores are in Queensland, where a depth of 5045 feet and a flow of 4½ million gallons a day have been attained.

Smaller artesian basins occur (*a*) on the border between Victoria and South Australia; (*b*) in five areas along the coast of Western Australia, the most important being at the head of the Bight—where artesian wells may facilitate the working of the transcontinental railway—and in the coastal plain north of Perth.

The quality of the water makes it chiefly useful for grazing areas. It is almost always fit for stock to drink, and often for man, but the contained 'alkali' seems in nearly all cases to make regular irrigation with it impossible. The most systematic use of it is made in New South Wales.

Artesian wells have supplied a portion of the data upon which the internal temperature of the earth has been calculated. They have their origin below that zone which is affected by the changing superficial temperature of the seasons, and consequently the water is of a constant temperature. Thus the Grenelle artesian well has a temperature of 81·7° F., while the mean temperature of the air in the cellar of the Paris Observatory is only 53°. Arago and Walferdin observed the temperature as the work proceeded, and found that there was a gradual and regular increase downwards. Walferdin also made a series of observations on the temperature of two borings at Creuzot, within a mile of each other, commencing at a height of 1030 feet above the sea, and going down to a depth, the one of 2678 feet, the other about 1900 feet. The results, after every possible precaution had been taken to ensure correctness, gave a rise of 1° F. for every 55 feet down to a depth of 1800 feet, beyond which the rise was more rapid, being 1° for every 44 feet of descent.

Artevelde, JACOB VAN, a Flemish popular leader in the 14th century, was a wealthy and high-born brewer of Ghent. In 1335, when war was raging between England and France, he gave his support to the former power, while the Count of Flanders sided with the latter; and he actually concluded a treaty with Edward III. Proclaimed governor of Flanders, for nine years he was almost absolute ruler; but he went too far when, in 1345, he proposed that the Black Prince should be elected Count of Flanders. For this the Flemings were not prepared, and Artevelde was killed in a popular insurrection, July 24, 1345. His son PHILIP VAN ARTEVELDE in 1381 headed a new revolt of the people of Ghent, and gained a victory over the Count of Flanders, the son of his father's old enemy. The count therefore sought the assistance of Charles VI. of France, and Philip was defeated and slain at Roosbeke, 1382. His history forms the theme of a fine drama by Sir Henry Taylor. See Hutton, *James and Philip van Artevelde* (1882).

Arthritis, inflammation of the joints. See JOINTS, RHEUMATISM, GOUT.

Arthropoda, a group of animals with jointed appendages. It is a phylum or sub-phylum—i.e. a series of related classes—and is allied to the Chætopods (bristle-footed worms). In both the body is made up of a series of segments, typically bearing appendages, and the central nervous system consists of dorsal supra-œsophageal ganglia, a ring-like commissure around the gullet, and a ventral chain of ganglia. In Chætopods the appendages are unjointed parapodia, while in Arthropods they are typically plated with Chitin (q.v.) and divided into joints. Even more distinctive is the fact that some of the appendages in Arthropods are brought into the service of the mouth as jaws—a transformation which does not occur in Chætopods. The Arthropods also differ from Chætopods, and agree with one another in the nature of the circulation, the body-cavity, the pre-oral region of the body, the brain, and the excretory organs.

Arthropods include a number of classes: Crustacea (such as crabs, lobsters, shrimps, prawns, barnacles, 'water-fleas'); Arachnida (such as

spiders, scorpions, and mites), along with which the extinct Trilobites and Eurypterids and the King-crabs (with one extant genus, Limulus) should perhaps be ranked; Onychophora (Peripatus and its relatives); Diplopoda or Millipedes; Chilopoda or Centipedes; Insects; and some doubtful classes, such as the Tardigrada or Bear-animalcules. See Sir E. Ray Lankester's *Treatise on Zoology* and A. Sedgwick's *Student's Text-book of Zoology*.

Arthrospore, a resting-cell in the Bacteria (q.v.).

Arthur, a legendary king represented as having united the British tribes in resisting the pagan English invaders, and as having been the champion not only of his people, but also of Christianity. He is said to have lived in the 6th century, and to have maintained a stubborn contest against Cerdic, but the Old English Chronicle is suspiciously silent as to his warfare and as to his existence. Indeed, the Welsh bards of the earliest period do not assert that he was a contemporary, and it is more than doubtful whether he is an historic personage. It is worthy of remark that the fame of Arthur is widely spread; he is claimed alike as a prince in Brittany, Cornwall, Wales, Cumberland, and the lowlands of Scotland; that is to say, his fame is conterminous with the Brythonic race, and does not extend to the Goidels or Gaels. As is now well known, Great Britain was twice invaded by races of Celtic speech; the first wave was that of the Goidels, and after a lapse of some considerable time a second Celtic wave, that of the Brythons or Britons from the east, overran Britain, and drove the Gaels to west and north. Finn and Ossian belong to the mythic heroic cycle of the Gaels, and Arthur and Merlin to that of the Britons. These several shadowy forms are probably deities shorn of their divinity and given historic attributes and position, much as, among the Norsemen, Odin, when he ceased to be regarded as the All-father or God, came to be reckoned as an ancestor of the kings.

In the lays of the Welsh bards, supposed to be as early as the 6th and 7th centuries (although no MS. is extant of older date than the 12th century), Arthur and his brave companions are celebrated, but modestly and without marvels. It is possible that there may have existed in the 6th century a prince bearing the already well-known heroic name; and if so, about him the myths belonging to the remote ancestor or god have crystallised. Skene fought hard for the historicity. More recent investigators have held that Artorius was Roman or of Romanic stock, and that his succession to the British sovereignty marks the beginning of Britain as a state. Gildas, who could have provided a contemporary account of Arthur, is silent about him: possibly he became famous in war against the Saxons after the *De Excidio* was written. The Arthuriana in Nennius (in the *Historia Brittonum*) occur in the part which is the work of a redactor in 810–25. Attempts to fix the chronology and facts from the confusions and miraculous elements in Nennius and Geoffrey of Monmouth are untrustworthy; but the student of Nennius gathers that the historical Arthur is not lost in Geoffrey's work. The Arthur who fought against the Saxons was aided by the kings of Britain, but was himself 'the leader in the wars.' Some of them, at any rate, were fought in the neighbourhood of Antonine's Wall. Now the Arthur of popular literature is the Arthur of romance. Historical features are doubtless his friendliness to the Church, to its faith, its order, and its ascetic institutions—all in direct contrast to his contemporary Maelgwn Gwynedd, whom Gildas denounces so severely. In the so-called Armoric collections of Walter, Archdeacon of Oxford (latter part of 11th century), from which Geoffrey of Monmouth (q.v.) professes to translate, the marvellous and supernatural elements largely prevail. Here for the first time does the magician Merlin come into association with Arthur. According to Geoffrey, Arthur's father, Uther, conceiving a passion for Igerna, wife of Gorlois, Duke of Cornwall, is changed by Merlin into the likeness of Gorlois, and Arthur is the result. After his father's death Arthur becomes paramount leader of the Britons, and makes victorious expeditions to Scotland, Ireland, Denmark, Norway, and also to France, where he defeats a great Roman army. During his absence his nephew Modred revolts, and seduces Arthur's wife, Gweniver (Gwenhwywar). Arthur, returning, falls in a battle with his nephew, and is carried to the Isle of Avalon (q.v.) to be cured of his wounds. Geoffrey's work apparently gave birth to a multitude of fictions which came to be considered as quasi-historical traditions. From these, exaggerated by each succeeding age, and recast by each narrator, sprang the famous metrical romances of the 12th and 13th centuries, first in French and afterwards in English, from which modern notions of Arthur are derived. In these his habitual residence is at Caerleon, on the Usk, in Wales, where, with his beautiful wife Guinevere, he lives in splendid state, surrounded by hundreds of knights and beautiful ladies, who serve as patterns of valour, breeding, and grace to all the world. Twelve knights, the bravest of the throng, form the centre of this retinue, and sit with the king at a round table, the 'Knights of the Round Table.' From his court knights go forth to all countries in search of adventure—to protect women, chastise oppressors, liberate the enchanted, enchain giants and malicious dwarfs, is their knightly mission.

A Welsh collection of stories called the *Mabinogion*, of the 14th and 15th centuries, and translated into English by Lady Charlotte Guest in 1849, gives further Arthurian legends. Some of the stories 'have the character of chivalric romances,' and are therefore probably of French origin; while others 'bear the impress of a far higher antiquity, both as regards the manners they depict and the style of language in which they are composed.' These latter rarely mention Arthur, but the former belong, as Skene puts it, to the 'full-blown Arthurian romance.' Chrétien de Troyes (q.v.), in the latter part of the 12th century, made the Arthur legend the subject for his *Romans* and *Contes*, as well as for two epics on Tristan; the Holy Grail, Peredur, &c. belonging to the same cycle. Early in the same century Arthurian metrical romance became known in Germany, and there assumed a more animated and artistic form in the *Parzival* of Wolfram of Eschenbach, *Tristan and Isolt* of Gottfried of Strasburg, *Erec and Iwein* of Hartmann, and *Wigalois* of Wirnt. The most renowned of the heroes of the Arthurian school are Peredur (Parzival or Perceval), Tristan or Tristram, Iwein, Erec, Gawein, Wigalois, Wigamur, Gauriel, and Lancelot. From France the Arthurian romance spread also to Spain, Provence, Italy, the Netherlands, and Iceland, and was again retransplanted into England, and given permanent literary form in Sir Thomas Malory's prose.

The name of King Arthur was given during the middle ages to many places and monuments supposed to have been in some way associated with his exploits, such as 'Arthur's Seat' near Edinburgh, 'Arthur's Oven' on the Carron near Falkirk, &c. What was called the sepulchre of his queen was shown at Meigle, in Strathmore, in the 16th century. Near Boscastle, in Cornwall, is Pentargain, a headland called after him 'Arthur's Head.' Other localities take his name

in Brittany. In the middle ages in Germany, Arthur's Courts were buildings in which the patricians assembled. Milton was meditating an Arthurian epic in 1639; and interest in the legends about King Arthur and his knights was revived by Tennyson and Wagner.

See Romances, Grail, Malory, Map (Walter), Merlin, Tennyson, Tristrem, &c.; Sir E. K. Chambers, *Arthur of Britain* (1927); Gaston Paris, *Histoire Littéraire de la France;* books by Sir John Rhŷs and Miss Weston; the standard editions of Nennius, Wace, Layamon, Chrétien de Troyes, &c.; Sommer, *The Vulgate Version of the Arthurian Romances* (1908–16).

Arthur, Prince, the posthumous son of Geoffrey (Henry II.'s fourth son) by Constance, Duchess of Brittany, was born in 1187. On Richard's death in 1199, Arthur, by the law of primogeniture, should have succeeded to the English crown; and the French king, Philip II., upheld his claims, until John (q.v.) bought him over to a disgraceful treaty. Arthur soon after fell into his uncle's hands, and was imprisoned, first at Falaise, afterwards at Rouen, where, on 3d April 1203, he is supposed to have perished, either by assassination or by drowning in an attempt to escape. The story of John's orders to Hubert to put out his eyes was current as early as 1228, and is treated in a celebrated scene of Shakespeare's *King John.*

Arthur, Chester Alan, twenty-first president of the United States, was born at Fairfield, in Franklin County, Vermont, on the 5th October 1830. His father was the Rev. W. Arthur, D.D., a Baptist minister, and a native of the north of Ireland. He distinguished himself as a student at Union College, New York, and devoting himself to law studies, was admitted to the bar in 1853. After having practised for some years, he was made a judge-advocate; at the outbreak of the great civil war he held the post of Inspector-general, and during the war was Quartermaster-general for the New York forces. He subsequently returned to law practice, but in 1871–78 was Collector of Customs at the port of New York. He was a leader of the Republican party in the State, and though belonging to the section of the Republicans opposed to Garfield on civil service reform, was made vice-president of the United States in 1881. Garfield's death in September 1881 called the vice-president to the supreme magistracy. Arthur held the office till 1885. During his term a bill dealing with the Mormon question was passed, and one with the Chinese question, as also a tariff bill with Protectionist bearings. He died 18th November 1886.

Arthur, Sir George, lieutenant-general, was born near Plymouth in 1784. As superintendent in charge of British Honduras, for eight years he ruled with strictness and energy, while treating the negro slave population with much humanity. In Tasmania, where he was lieutenant-governor from 1824 to 1836, his rule was even more despotic; but despotism was needed, for the colony, up to that time a neglected appendage of New South Wales, was overrun with bushrangers who had escaped from the convict settlements, and whose treatment of the natives kept them also in constant turmoil. By establishing at Port Arthur a prison-settlement from which escape was very difficult, and by arranging with friends of the natives (after one attempt at forcible concentration which was a fiasco) to collect them on a group of islands in Bass Strait, Arthur restored peace, and aided, though he did not encourage, free settlement. During his rule the population of the island trebled, and its trade increased 1200 per cent. Afterwards, as lieutenant-governor of Upper Canada (1837–41), he was successful in coping with discontent. Lieutenant-governor of Bombay (1842–46), he was energetic in establishing British power in Sind, and put down a rising in Kolapur. Appointed provisional governor-general, he had to leave India because of ill-health. He died in 1854.

Arthur's Seat, a well-known lion-shaped hill immediately east of Edinburgh, and within the burgh boundary, rising to a height of 822 feet above sea-level. The ascent is easy, and the prospect from the top unrivalled. Arthur's Seat is supposed to derive its name from the British king. Like most of the hills in and around Edinburgh, it consists of hard, resistant igneous rocks; it was one of the many loci of volcanic activity in the midland valley of Scotland in Carboniferous times. The lava-form rocks are basalts, which, with their associated 'ashes,' are best developed in the *Whinny Hill.* The oldest flow forms the *Long Row.* Between it and the hill intervenes the *Dry Dam* eroded in a series of soft tuffs. Two chief centres of eruption may be recognised. The older, known as the *Lion's Head* vent, includes the basalt of the Lion's Head; the younger and more extensive takes its name from the *Lion's Haunch.* The junction between the two is well seen in the '*Gutted Haddie,*' where the agglomerate of the younger vent is seen to contain an old scree made up of fragments of the Lion's Head basalt. *Samson's Ribs* and *Dunsapie Hill* consist of intrusive basalts which have risen along the margin of the Lion's Haunch neck. The *Salisbury Craigs* form an independent intrusion, and on the slope between the Craigs and the Hunter's Bog occurs a third and smaller neck. See *Description of Arthur's Seat Volcano,* by B. N. Peach.

Artichoke (*Cynara Scolymus*), a thistle-like perennial plant belonging to the tubulifloral group of composites, probably derived from the Cardoon (q.v.) of the Mediterranean region, *C. Cardunculus.* The radical leaves are 3 to 4 feet long, somewhat spiny, pinnatifid, or undivided. The stem is 2 or 3 feet high, branched, with large heads of violet-coloured (sometimes white) thistle-like flowers at the summits of the branches. The plant has been long cultivated for the sake of the delicate succulent *receptacle* or broadened axis of the flower-head, taken before the flower expands, which is boiled and eaten with melted butter, or sometimes eaten raw with salt and pepper. The part used is the same which is called the *cheese* in thistles by children, and is sometimes eaten by them. The tender central leaf-stalk is also occasionally used

Artichoke.

in the same way as that of the Cardoon. Several varieties are in cultivation, differing in the more or less spiny leaves, and the more or less globose form of the head. Artichokes are generally propagated by rooted slips or suckers in spring. These are planted in rows about 4 feet asunder,

and 2 feet apart in the row. The artichoke bed continues productive for several years. Sea-weed is an excellent manure.—The name artichoke is often applied without qualification to the Jerusalem Artichoke (q.v.), which is a totally different plant, being a kind of sunflower (*Helianthus tuberosus*).

Articles of Association. See COMPANY.

Articles of War, ordinances for the government of troops, seamen, and camp-followers, by punishing, as crimes, acts or omissions which, in civil life, would be mere breaches of contract—e.g. desertion or disobedience of orders. *Military Articles of War* were, prior to the passing of the first Mutiny Act (q.v.) in 1689, the only ordinances for regulating discipline amongst the troops raised, from time to time, for each campaign. They were issued by the crown or by the commander-in-chief, in pursuance of authority conferred by the crown, for each campaign, and ceased to operate on its conclusion. This prerogative power, dating from the Conquest, was superseded in 1803 by a corresponding statutory power, expressed in section 69 of the Army Act of 1881, but not likely to be used. The earliest complete code, dated 1385, is the 'Statutes, Ordinances, and Customs' of Richard II. Articles of War were then issued by Henry V., Henry VII., and during the great Rebellion by both sides, in almost identical language; those of Lord Essex were published under an ordinance of the Lords and Commons. Charles II. and James II. also issued Articles of War. The former, dated 1672, formed the groundwork of those issued in 1878, which were consolidated with the Mutiny Act in the Army Discipline and Regulation Act of 1879, now replaced by the Army Act of 1881 (see the article ARMY); but the earlier Articles were of excessive severity—death or loss of limb for almost every crime.—The United States Articles of War are published in the annual Army Regulations, and cover generally the same ground as those of England. Sentences of death by courts-martial, as in the United Kingdom, must be concurred in by at least two-thirds of the members, and, with few exceptions, must be confirmed, before execution, by the president of the United States.

Naval Articles of War are similar in every respect to those for the army, and, like them, have been incorporated in a Naval Discipline Act, of which they form the first section. The power of the Admiralty to make Articles of War for the government of the Marines is recognised in section 179 of the Army Act, under which this body is disciplined when not borne on the books of a man-of-war in commission.—In the United States, marines are subject to the regulations for the army or navy, according as they happen to be engaged with either branch of the service; the Naval Articles being, however, essentially the same as those governing the army.

Indian Articles of War are a distinct and special body of regulations, and apply only to officers, soldiers, and camp-followers who are natives of India.

Articles, The Six, were imposed by act of parliament in 1539, when, Henry VIII. being displeased with some of the bishops most favourable to the Reformation, their opponents for a time regained the ascendency. These articles asserted the doctrine of transubstantiation, declared communion in both kinds not to be necessary, condemned the marriage of priests, enjoined the continued observance of vows of chastity, and sanctioned private masses and auricular confession. The act imposing them was popularly called 'the six-stringed whip.' Severe penalties were appointed for writing or speaking against them, and for abstaining from confession or the sacrament at the accustomed times, for priests failing to put away their wives, and for persons writing or speaking against the doctrine of transubstantiation. Archbishop Cranmer vainly opposed the act in the House of Lords: the king was resolute to have it passed. Its severity was mitigated by a subsequent act of his reign (1544), and although it continued substantially unrepealed, it was transgressed with impunity even by ecclesiastical dignitaries.

Articles, The Thirty-nine, of the Church of England, are the articles of religion which were agreed upon by the archbishops and bishops of both provinces and the whole clergy in the convocation held at London in the 4th year of Elizabeth, 1562, under Archbishop Parker. To have a clear view of the history of these important articles, we must go back to the promulgation of the original ones, forty-two in number, in the reign of Edward VI. The council appointed by the will of Henry VIII. to conduct the government during the king's minority, was for the most part favourably disposed towards the Reformed opinions, and the management of church affairs devolved almost entirely upon Archbishop Cranmer. In the year 1549, an act of parliament was passed, empowering the king to appoint a commission of 32 persons, to make ecclesiastical laws. Under this act, a commission of 8 bishops, 8 divines, 8 civilians, and 8 lawyers (amongst whom were Cranmer, Ridley, Hooper, Coverdale, Scory, Peter Martyr, and Justice Hales), was appointed in 1551, and one of its first acts was to draw up a code of articles of faith. These were forty-two in number, and were set forth by the king's authority in 1553. Strype makes it appear that these forty-two articles were agreed upon in the convocation that was sitting in 1552, but his assertion has been much questioned. Against Strype may be cited not only Fuller, but also Burnet, Lamb, and Palmer. But perhaps the best authority on the subject, Archdeacon Hardwick, in his *History of the Articles of Religion* (1859), makes it appear highly probable that Strype's view was correct. To these articles was prefixed the Catechism, and there is no doubt that Cranmer had the principal hand in their composition; for he owned before Queen Mary's commission that they were his doing. But immediately after their publication, Edward died, and one of the first acts of the convocation summoned with the parliament in the first year of Queen Mary, was to declare that these forty-two articles had not been set forth by the agreement of that House, and that they did not agree thereto. In 1558 Elizabeth succeeded her sister. In 1559 Parker was installed in the see of Canterbury, and immediately the other vacant sees were filled up. And now came a fresh opportunity of drawing up some articles of faith which might serve as a test of orthodoxy in the Reformed Church. Parker applied himself to this work, and, for the purpose, revised the forty-two articles of King Edward, rejecting four of them entirely, and introducing four new ones—viz. the 5th, 12th, 29th, and 30th, as they now stand, and altering more or less seventeen others. This draft Parker laid before the convocation which met in 1562, where further alterations were made; and the 39th, 40th, and 42d of King Edward's, which treated of the resurrection, the intermediate state, and the doctrine of the final salvation of all men, were finally rejected. The 41st of King Edward's, which condemned the Millenarians, was one of the four which Parker omitted. Thus the articles were reduced to thirty-nine. They were drawn up and ratified in Latin, but when they were printed, as was done both in Latin and English, the 29th was omitted, and so the number was further reduced to

thirty-eight. From these thirty-eight there was a further omission—viz. of the first half of the 20th article, which declares that 'the church hath power to decree rites and ceremonies, and hath authority in controversies of faith.' As all the records of convocation perished in the great fire of 1666, it is very difficult to ascertain how these omissions arose. However, in 1571 the articles once more underwent revision, Archbishop Parker and Bishop Jewel making a few trifling alterations, and the 29th being restored. The convocation which was then sitting ratified them both in Latin and English, and an act of parliament was passed in that year compelling the clergy to subscribe 'such of them as only concern the confession of the true Christian faith, and the doctrine of the Sacraments.' There still, however, remained some difficulty as to which was the authorised copy, some of the copies being printed with, and others without, the disputed clause of the 20th; but this was finally settled by the canons passed in the convocation of 1604, which left the thirty-nine articles as they now stand. 'His Majesty's Declaration,' which precedes them, and directs that they shall be interpreted 'in their literal and grammatical sense,' was prefixed by Charles I. in 1628.

It may be interesting to know from what other sources the thirty-nine articles are derived. Some of them, as the 1st, 2d, 25th, and 31st, agree not only in their doctrine, but in most of their wording, with the Confession of Augsburg. The 9th and 16th are clearly due to the same source. Some of them, as the 19th, 20th, 25th, and 34th, resemble, both in doctrine and verbally, certain articles drawn up by a commission appointed by Henry VIII., and annotated by the king's own hand. The 11th article, on justification, is ascribed to Cranmer, but the latter part of it only existed in the articles of 1552. The 17th, on predestination, may be traced to the writings of Luther and Melanchthon.

The thirty-nine articles have been described as 'containing a whole body of divinity.' This can hardly be maintained. They contain, however, what the Church of England holds to be a fair scriptural account of the leading doctrines of Christianity, together with a condemnation of what she considers to be the principal errors of the Church of Rome and of certain Protestant sects. As far as they go (and there are many things unnoticed by them) they are a legal definition of the doctrines of the Church of England; though it is to the *Book of Common Prayer* that members of that communion look for the genuine expression of her faith. They were adopted by the convocation of the Irish Church in 1635, and by the Scottish Episcopal Church at the close of the 18th century. Corpus Christi College, Cambridge, contains the only copies of the Articles in manuscript or print that are of any authority. Amongst them are the Latin manuscript of the Articles of 1562, and the English manuscript of the Articles of 1571, each with the signatures of the archbishops and bishops who subscribed them.

See Hardwick's history of the Articles already cited. Amongst the commentaries upon them are those by Bishop Burnet (1669); Bishop Beveridge (1716); Bishop Forbes of Brechin (2d ed. 1871); and that most countenanced by Anglican authorities, the exposition by Dr Harold Browne, Bishop of Winchester (Lond. 12th ed. 1882). *Tract XC.*, by Cardinal Newman, illustrated the 'elasticity' of the Articles. See also the articles CREEDS and CONFESSIONS.

Articula'ta or ARTICULATED ANIMALS, one of the great primary divisions of the Animal Kingdom, according to the system of Cuvier (see ZOOLOGY). It included those animals of which the body is divided into a number of distinct joints—viz. the higher worms or Annelids, and also the Insects, Crustaceans, Arachnids, and Myriapods. The four latter groups were separated from the Annelida (q.v., and see also WORMS) by Von Siebold, on account of their possession of hollow jointed limbs, into a separate sub-kingdom, Arthropoda (q.v.).

Articulation. See JOINTS.

Artificial. See DENTISTRY, RESPIRATION, SILK (ARTIFICIAL), STONES (PRECIOUS), PEARLS, &c.

Artificial Limbs are mechanical contrivances adapted to reproduce the form, and as far as may be, the function of a lost or absent member. They have, in one form or other, been in use from very early times. Herodotus mentions the case of a prisoner who amputated his own foot to escape from his shackles, and, escaping to his friends, was provided with a wooden substitute. The brave M. Sergius, great-grandfather of Catiline, was consul in the year 167 B.C. He lost his right hand in his second campaign; and received twenty-three wounds, so that neither his remaining hand nor his feet were fully serviceable. Notwithstanding this, he fought in four battles with his left hand only; afterwards he made himself an iron hand, and fighting with it fastened on, was instrumental in raising the siege of Cremona, in protecting Placentia, and in storming twelve of the enemy's camps in Gaul, during the second Punic war (Pliny, *Hist. Nat.* 28, 104–106). In 1885 a remarkable specimen was discovered in a tomb at Capua along with other relics dating from 300 B.C.; it is thus described in the catalogue of the London Royal College of Surgeons, where the specimen is preserved: 'Roman Artificial Leg.—The artificial limb accurately represents the form of the leg. It is made with pieces of thin bronze fastened by bronze nails to a wooden core. Two iron bars, having holes at their free ends, are attached to the upper extremity of the bronze. A quadrilateral piece of iron, found near the position of the foot, is thought to have given strength to it. There was no trace of the foot, and the wooden core had nearly all crumbled away. The skeleton had its waist surrounded by a belt of sheet bronze, edged with small rivets, probably used to fasten a leather lining.' The upper third of the leg was hollow, while the lower two-thirds were filled with wood.

The celebrated artificial hand of the German knight, Götz von Berlichingen—'Götz of the Iron Hand'—was invented about 1504 by a mechanic of Nuremberg. It weighed three pounds, and was so constructed as to grasp a sword or lance. In the twelfth chapter of Ambroise Paré's *Œuvres de Chirurgie*, as translated by Thomas Johnson in 1605, it is described 'by what means arms, legs, and hands may be made by art, and placed instead of the natural arms, legs, and hands that are cut off or lost.' No improvements worthy of record were made from the time of Ambroise Paré till the beginning of the last century, when Baillif of Berlin constructed a hand which did not exceed a pound in weight, and in which the fingers, without the aid of the natural hand, not only exercised the movements of flexion and extension, but could be closed upon and retain light objects, such as a hat, and even a pen. Recent years have seen great advances in the adaptation of these mechanical contrivances to varied requirements. The first *desideratum* in an artificial limb is lightness. This applies equally to both upper and lower extremities. In other respects, however, important differences exist between what is desirable in an artificial arm and what in an artificial leg. In the former, *mobility*, to the extreme limit

compatible with control over its movements, is wished for; in the latter, *stability* is chiefly thought of. The artificial arm is destined to reproduce as far as possible the prehensile powers of the lost upper extremity; the artificial leg, the weight-supporting function of the natural lower limb. In both, the mechanical appliance must fit accurately and grasp firmly the stump of the natural limb; and this without exerting injurious pressure or causing discomfort at any point.

Arms.—The utility of an artificial arm depends much on the nature of the stump. A stump above the elbow is most suitable when it tapers gradually to its lower end, and terminates in a rounded surface. When an arm is removed at the shoulder-joint, and there is no stump, an artificial arm can still be fixed in its proper place by means of a corset. In amputation below the elbow-joint, the best stump is one formed by amputation at the wrist. The simplest form of artificial arm after amputation above the elbow, consists of a leathern sheath accurately fitted to the upper part of the stump. The lower end of the sheath is furnished with a wooden block and metal screw-plate, to which can be attached a fork for holding meat, a knife for cutting food, or a hook for carrying a weight. The arm should be so carried as to represent the position of the natural arm when at rest. It is retained in its position by shoulder and breast straps, and forms a light, useful, and inexpensive substitute for the lost member. More complicated, and therefore more expensive pieces of apparatus are made, in which motion is given to the fingers, a lateral action of the thumb is obtained, the wrist-movements are partially imitated, and a degree of natural softness given to the hand by a covering of gutta-percha and india-rubber. Nothing tended so much to the development of artificial arms and hands as an accident which happened about three-quarters of a century ago to the celebrated French tenor, Roger, who lost his right arm above the elbow. It was necessary, for his future appearance on the stage, that he should have an artificial limb, which would serve the purposes of histrionic action, and permit him to grasp a sword and draw it from its scabbard. Such a contrivance was invented in 1845 by Petersen, a Prussian mechanician, and the French Academy of Sciences commissioned MM. Gambey, Rayer, Velpeau, and Magendie to report upon it. The apparatus, which weighed less than 18 ounces, was tested upon a soldier who had lost both arms. By its aid he was enabled to pick up a pen, take hold of a leaf of paper, &c. Petersen's conceptions were improved by Messrs Charrière, the celebrated surgical mechanics of Paris, aided by Huguier, the well-known surgeon. An excellent artificial hand was invented by Heather Bigg, in which voluntary and variable movement is conferred on the thumb by a closed hydraulic apparatus. By compressing an india-rubber ball placed under the armpit, a piston is worked that can open or close the grasp of the thumb, with gentle or with forcible pressure as required. This added automatic mobility was a great advance in the construction of such appliances. (See H. Bigg, *Artificial Limbs and Amputations*, 1885).

Fig. 1.

The Beaufort arm (fig. 1) possesses a similar 'instinctive' power of movement. It consists of a wooden hand attached to a leathern socket that firmly fits the stump. The fingers are half-closed parallel to one another, the first two finger-tips opposing that of the movable thumb. The thumb is pivoted on a pin concealed in the ball of the thumb; it is firmly pressed against the finger-tips by a strong india-rubber band similarly concealed. A piece of whip-cord is attached to the back of the thumb, whence it runs upwards to the shoulder of the wearer, and across his back to the opposite shoulder, around which it is fastened by a tape loop. By drawing upon and relaxing the whipcord, the grasp of the thumb is alternately opened and closed; and these movements can be attained by slight movements of the shoulders, or by advancing and retracting the artificial arm. This arm was adopted by the French government for distribution to soldiers maimed in the Franco-German war of 1870–71. It is a remarkably efficient appliance, and has the advantage of cheapness, so that it is within the reach of all classes.

Legs.—The object in view here is to support weight, and to supply movement useful in progression. Weight can be borne in three ways in an artificial leg: (1) On the end of the stump; (2) by the contact-friction between the surface of the limb and a tightly fitting sheath; and (3) on the tuberosity of the ischium or 'sitting bone.'

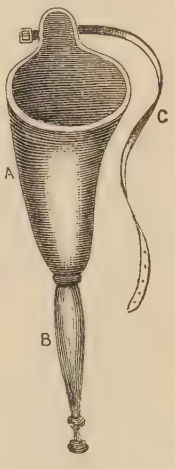


Fig. 2.

The simplest artificial leg is the 'bucket' leg (fig. 2), consisting of a hollow wooden or leathern sheath, A, fitting accurately to the contour of the stump, and having a 'peg,' B, firmly attached to its lower end. The weight is here chiefly borne by the 'sitting bone,' which reposes on the smooth brim of the 'bucket.' The end of the stump should not quite reach the floor of the 'bucket;' hence it takes no part in supporting the weight of the body, which might give rise to pain in the stump. This appliance is suited only for amputation through the thigh. Its great defects are the absence of bending at the knee, and the absence of a foot, which makes it useless on soft ground.

Of the more complicated forms of artificial leg three are especially popular. The first of these is of English origin, and owing to its having been adopted by the Marquis of Anglesey, is known as the *Anglesey leg;* it is fully described in Gray's work on *Artificial Limbs.* The second is that invented by an American named Palmer, and called the *Palmer leg.* From its lightness and the greater ease of walking with it, it soon superseded the Anglesey leg in America. In the third, also invented in America, and known as *Dr Bly's leg*, the principal faults of the two other legs have been completely overcome. The advantages of this leg are thus summed up by Mr Bigg: (1) Adaptation to all amputations either above or below the knee. (2) Rotation and lateral action of the ankle-joint. (3) Power on the part of the patient to walk with ease on any surface, however irregular, as, owing to the motion of the ankle-joint, the sole of the foot readily accommodates itself to the unevenness of the ground. (4) The ankle-joint is rendered perfectly indestructible by ordinary wear, owing to its centre being composed of a glass ball resting in a cup of vulcanite. (5) The action of the ankle-joint is created by five elastic tendons, placed to accord with the position

assigned to them in a natural leg. These tendons are capable of being rendered tight or loose in a few seconds, so that the wearer of the leg has the power of adjusting with precision the exact degree of tension from which he finds the greatest comfort in walking. (6) There is a self-acting spring in the knee-joint, urging the leg forward in walking, and imparting automatic motion. (7) The whole is covered by a flesh-coloured enamel, which can be washed with soap and water. (8) At the knee-joint there is a mechanical arrangement representing the crucial ligaments, and affording natural action to that articulation by which all shock to the stump in walking is avoided. Hermann's artificial limb is still more highly approved by many, as affording more support when the knee is bent. See Max Schede's work on Amputation, and the *System of Surgery* by Holmes and Hulke (3d ed. 1883).

The Beaufort leg (fig. 3), invented by the Count de Beaufort in 1851, and improved subsequently, has three great recommendations: it lengthens the stride that can be safely taken, it reproduces the natural gait, and it is remarkably cheap. Baron Larrey, the celebrated French surgeon, reported on this invention to the Academy of Medicine, that 'it consists of a piece of ash-wood, which, like the peg, is attached to the ordinary wooden leg. It replaces the metal disc of the peg, and is shaped somewhat like a foot, but shorter in length. The plantar surface is covered with a leathern sole, garnished with cork at the heel. *It is curved in form*, the curve being such as to give the limb continuous lines of bearing on the ground while the body moves forward, save that the curve is not so perfectly uniform as to involve any danger of slipping.' He shows how the curved sole is instrumental in increasing stability, in lengthening the pace, and in giving it a natural character. In 1865 this new form of foot was adapted to a new leg-case, with lateral supports of ash-wood, and a joint corresponding to the knee, applicable to cases of amputation of all sorts. The Great War led to great improvements in artificial limbs. For artificial eyes, noses, palates, teeth, see EYE, RHINOPLASTIC OPERATIONS, PALATE, DENTISTRY, TEETH.

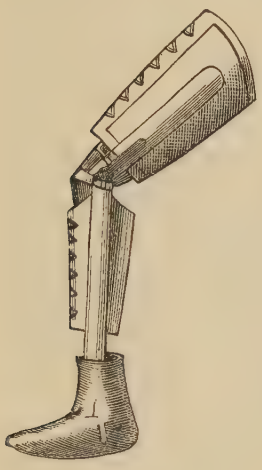


Fig. 3.

Artillery originally meant any projectile, weapon, or engine of war, even bows and arrows and slings; now it means either cannon of any description or the soldiers who manage the cannon. It is here used in the latter sense; the description of various kinds of ordnance will be found either under CANNON or under their special names. *Artillery Park* is the name given to an assemblage of wagons of ammunition and appliances, which form a reserve for an army in the field or for an army undertaking a siege.

Artillery Corps.—The introduction of field-guns necessitated the formation of a body of men set apart to study the force and action of gunpowder, the flight and range of projectiles, the weight and strength of cannon, and the manœuvring of heavy masses of field artillery; and after the great wars in the beginning of the 19th century artillery had become the third great branch of military service.

Artillery is divided into two great classes, field and garrison or siege. The former is divided into *Batteries* and *Brigades* (q.v.) as tactical units, and, besides the highly trained horse, field, and mountain, there are field howitzer batteries and brigades, and 'heavy' (60-pounder) batteries. Marine artillerymen belong to the navy, and work the heavy ships' guns. They are organised like infantry, in companies.

The Royal Regiment of Artillery is the collective name for the whole of the artillery of the British army. Formed first in 1715, and granted precedence next to the cavalry and above the engineers and infantry, it has received constant additions, comprising *Horse, Field,* and *Garrison Artillery.* The personnel of the first two are interchangeable. The regular mountain artillery, which exists only in India, has 8 batteries of British and 10 of Indians, and is a part of the garrison artillery. The Territorial Force has 3 mountain batteries.

In action, the horse artillery, having all the men mounted, can manœuvre with cavalry; the field artillery, carrying the gunners on the guns and wagons, and being armed with a heavier weapon, cannot move at such a rapid pace except for short distances. The garrison artillery furnishes the heavy (60-pounder) batteries, whose guns and wagons are readily mobile on good roads, but need bullocks or elephants in difficult country; but its chief duty is to work the heavy guns of forts, siege batteries, and coast defences.

Regular Artillery.—Before the Great War there were 28 batteries of horse artillery, of which about half were usually stationed at home. The field artillery numbered 150 batteries, of which a number were kept in peace-time on a four-gun basis for economy, while a full battery of horse or field artillery has six guns. About a third of the field batteries were in India. The heavy (60-pounder) battery, of which there were 12, has four guns. The garrison artillery is organised in companies, of which there were 100, about 30 being in India. They furnish officers and men for the heavy and medium siege brigades (see BRIGADE).

Garrison companies had each 5 officers and 129 rank and file. Horse and field artillery batteries have a major in command and 4 other officers, 9 sergeants, and 9 artificers. They have 178 and 175 rank and file respectively, of whom some are 'gunners' and some 'drivers,' with a detachment of signallers, range-takers, &c., and they have 220 and 180 horses respectively. Each battery has 12 ammunition-wagons in first line, and 6 in the ammunition column (see COLUMN). The horse artillery is armed with 13-pounder Q.F. guns, the field artillery with 18-pounder Q.F. guns (see CANNON). A mountain battery has 6 10-pounder jointed guns in war (2 in peace time), 265 draught and pack animals (mules), and a personnel of 5 officers and 112 rank and file. The gun and carriage are taken to pieces for transport. All artillery fires with smokeless powder.

Men of the horse artillery enlisted for six years with the colours, and six years in the army reserve (see ARMY); of the field artillery, for six or three years with the colours, six or nine in the army reserve; of the garrison artillery, for eight years with the colours, four years in the army reserve.

The army estimates for 1911–12 showed the following numbers, including India:

ROYAL HORSE AND ROYAL FIELD ARTILLERY (REGULARS).

Commissioned officers	1,108
Other ranks	28,929
Horses	23,967

ROYAL GARRISON ARTILLERY (REGULARS).

Commissioned officers	805
Other ranks	17,773
Horses and mules	2,493

Besides these, there is a considerable personnel of all ranks employed extra-regimentally, a number that would raise the total to nearly 50,000. This is approximately the peace establishment. In the Great War the *personnel* rose to more than ten times this figure, the chief increase being in the garrison, which title is becoming a misnomer. The army reserve and the special reserve (see ARMY) provide a large addition on mobilisation for war, when also a very large addition of horses is obtained by the method of registering 'civilian horses' in peace-time, and by 'boarding out' trained horses.

There is a Royal Field Reserve Artillery, consisting of 31 batteries, and there are 2 batteries of Royal Garrison Reserve Artillery.

The Artillery of the Territorial Force.—The Honourable Artillery Company, the oldest existing volunteer corps of the country, has been incorporated into the Territorial Army. Together with the *Sergeants-at-arms*, the *Yeomen of the Guard*, and the *Gentlemen Pensioners*, it was established as far back as 1537, when Henry VIII. granted a patent creating the 'Fraternity or Guild of Artillery of Long-bows, Cross-bows, and Hand-guns.' In 1638 the Corporation of the City of London presented to the company the Artillery Grounds, near Moorfields, for military exercises. Royal princes frequently enrolled themselves as members of the company, usually as 'captain-general.' In 1780, during the 'Lord George Gordon riots,' this company effectually protected the Bank of England; always ready if needed, it never engaged in actual warfare until it fought in South Africa, 1900–1902. Its members used to be elected by the ballot of a Court of Assistants, pay two guineas annual subscription and £5 entrance fee, and supply uniforms, but not arms and accoutrements. The company is the only volunteer body allowed to march through the streets of the City with bayonets fixed. See G. A. Raikes, *History of the Hon. Artillery Company* (2 vols. 1878–80).

The Territorial Force contains all the categories of artillery—viz. 11 batteries of horse, 55 brigades of field (see BRIGADE) armed with 18-pounders Q.F. (quick firer), 14 batteries heavy, 3 mountain, and 93 companies garrison for the defended ports and big guns in the field.

The Colonial Artillery.—The crown colonies and the overseas dominions have a considerable artillery force. Hong-kong and Singapore have 5 garrison companies, the West Indies 3, Sierra Leone 1, all administered by the War Office. The Colonial Office maintains 4 batteries in Nigeria. Canada kept in 1913 30 mounted batteries and 20 garrison companies. Australia, having organised universal service, has a large artillery force. The New Zealand Volunteers had (1913) 6 batteries and 9 garrison companies. The Union of South Africa has developed a strong artillery corps.

Artillery Schools.—The first school for artillery instruction was established by the Venetians in the beginning of the 16th century. Soon afterwards Charles V. established similar schools at Burgos and in Sicily. The French founded a school of practical artillery in 1675, and soon after a theoretical school at Douai. Saxony had an artillery school in 1766, but the other German states were more tardy in this direction. The officers' studies in such schools comprise mathematics, as much of physics and chemistry as is necessary, the theory and practice of ranging and indirect firing (see BATTERY), field and permanent fortification, tactics, &c. The practical exercises include gun and howitzer drill, reconnoitring for and taking up fire positions, ranging, and indirect firing, siege operations, laboratory and manufacturing studies. All the Continental Powers, as well as the United States, Japan, and others, have such schools, situated at points where ample range is available, some on the seacoast and some inland. The self-governing dominions are instituting similar schools, which will resemble those of Great Britain. The British school of gunnery is at Shoeburyness, the SE. point of Essex, and thus at the mouth of the Thames, where there is a 10-mile range along the Maplin Sands. The field artillery school is transferred, from April till October, to the inland ranges at Okehampton, on Dartmoor, and at Barry in Scotland; and the garrison artillery school spends some time annually at Lydd, in Kent, where the destruction of obstacles by heavy guns is practised. The navy has its artillery school on Whale Island, in Portsmouth Harbour. India has no considerable artillery school.

A *Royal Military Academy* was established at Woolwich in 1741 for the artillerists and engineers of the royal army. The East India Company sent their cadets to this academy from 1798 to 1810; but afterwards, until 1861, they maintained a separate establishment at Addiscombe. The students at the academy are admitted, by open competition for the most part, between the ages of seventeen and nineteen, and remain two years. The sons of military and naval officers are admitted on lower terms than those of other persons. A number of establishments of instructional or manufacturing character exist in connection with the artillery—at Woolwich, the Military College of Science, ordnance factories and laboratory, inspection and experimental staff, Royal Artillery Committee; at Waltham Abbey, gunpowder factory; at Shoeburyness, experimental staff; and relations are preserved with ordnance manufacturers like Vickers and Armstrong.

Anti-aircraft.—A late development is the provision of guns for dealing with aircraft, a matter in which all the great Powers are experimenting. The chief trouble is in ranging, for a miss does not, as in land and sea firing, show by a strike the extent and direction of the error. This can be met by the shell leaving a trail of smoke in its flight, but the high speed of aircraft imparts a serious difficulty. Practice, also, at this kind of shooting is evidently only to be had by towing a target behind an aeroplane or airship, which is neither easy nor satisfactory. The best condition for the gunner is when the aircraft is right above him; but, as the shell or its pieces must return to earth, the vicinity of the anti-aircraft battery would be an unpopular stance for friendly troops.

Artiodactyla, 'even-toed' hoofed animals or Ungulates, in which the third and fourth digits form a symmetrical pair between which lies the median plane or axis of the foot. Ox, sheep, deer, and pig are familiar examples. The term is used in contrast to Perissodactyla, the 'odd-toed' Ungulates, including horse, tapir, rhinoceros, and many extinct types, in which the median plane or axis of the foot bisects the third digit (in the case of the horse the only fully formed digit). There are many other differences between the two sub-orders; thus Artiodactyla have two or four toes on the hind-foot, while Perissodactyla have one or three; Artiodactyla have nineteen dorso-lumbar vertebræ, while Perissodactyla have always more than twenty-two. The contrast broadly corresponds to the old divisions of cloven-hoofed and solid-hoofed respectively.

Artiodactyla made their appearance in the Eocene. They are represented in every part of the world except Australia and New Zealand,

and include seven or more families with living representatives, besides others entirely extinct. The sub-order may be divided into the non-ruminants and the ruminants or cud-chewers. The non-ruminants include the pigs, peccaries, and hippopotamus. In the Old World pigs (Suidæ) digits III. and IV. reach the ground, II. and V. are much shorter; the skin bears numerous bristles and hairs; the molar teeth are tuberculated; there is a short mobile snout; the stomach is relatively simple, with a single diverticulum. In wild swine the number of young may be four to six, in domesticated races still more, and in this the Suidæ are contrasted with the other Ungulates. The New World peccaries are referred by many to a separate family, Dicotylidæ, for they are in several respects divergent. Thus on the hind-foot the fifth digit is practically absent, the stomach has two diverticula, and there are only two mammæ. The Hippopotamidæ include two living species, herbivorous, unwieldy, semi-aquatic animals, with very thick skin and few hairs, with all the four digits reaching the ground, with large incisors and canines, and with a three-chambered stomach.

The ruminants include cattle, sheep, antelopes, prong-buck, giraffes, deer, chevrotains, and camels. The Camelidæ or Tylopoda are represented by two extant genera, the Old World Camelus (camel and dromedary) and the New World Lama (llama and alpaca). The Tragulidæ or Chevrotains are small hornless animals in two genera, survivors of an ancient family regarded by some as linking ruminants to the other Artiodactyla. The Cervidæ or deer are usually marked by solid deciduous antlers. In the reindeer both sexes have antlers; in all other living forms the antlers, if present, are confined to the males. They are absent in the musk-deer (Moschus) and in the water-deer (Hydropotes). The Giraffidæ include the well-known, long-legged, long-necked giraffes, with short, permanent, skin-covered horns in both sexes, and the rare Okapi (q.v.). The prong-buck (Antilocapra) of North America has horns of the antelope type, but the horny sheath is periodically shed; for this and some other reasons it is often referred to a separate family, Antilocapridæ. The remaining extant Artiodactyla are the Bovidæ—cattle, sheep, goats, chamois, and a huge number of antelopes. Horns, consisting of a bony core and an outer horny covering, occur in the males of Bovidæ, and very often in the females as well. The term Pecora or Cotylophora is often applied to the ruminants after the exclusion of camels and chevrotains. Most ruminants are without incisors in the upper jaw, the lower incisors and canines biting against a horny pad. All ruminants have half-moon-like ridges of enamel on the crown of the premolars and molars (selenodont). A typical ruminant stomach shows four chambers—the rumen or paunch, the reticulum or honeycomb, the psalterium or manyplies, and the abomasum or reed. The first three belong to the base of the gullet; only the fourth is true stomach. The hastily swallowed grass and the like passes into the rumen and reticulum; at the cud-chewer's leisure it is regurgitated to the mouth and thoroughly masticated. Descending again, it practically omits the first two chambers and passes along a groove, with approximated sides, into the psalterium, and thence into the abomasum, where gastric digestion begins.

See RUMINANTS, BOVIDÆ, DEER; also PIG, HIPPOPOTAMUS, ALPACA, ANTELOPE, BUFFALO, CAMEL, GIRAFFE, LLAMA, SHEEP, &c.

Artocarpaceæ, a family of archichlamydeous dicotyledons, of which the Bread-fruit (*Artocarpus incisa*) is the most familiar example; it is usually included in the Moraceæ, or includes the Moraceæ, and is often grouped as a division of the great nettle family, Urticaceæ, but by Baillon under Ulmaceæ. The Artocarpaceæ proper are almost all tropical trees, and include many highly useful species, as well as some deleterious to man. The milky juice of some (Castilloa) yields India-rubber (q.v.); and that of a few species is so bland as to be used as a substitute for milk (see COW-TREE). The juice of others is, however, very poisonous, as that of *Antiaris toxicaria*, the poison usually called Upas (q.v.) by the Javanese. The fruits (see FIG, JACK) are wholesome; the importance of Bread-fruit (q.v.) in the South Sea Islands is well known; and the seeds of the Musanga of the Gold Coast of Africa, and of *Brosimum Alicastrum* (Bread-nut) in the West Indies, are eaten as nuts. The fibrous bark of the Bread-fruit tree is made into cloth; its wood is used for building, its male catkins for tinder; its leaves serve as substitutes for table-cloths and wrapping-papers, and its milky juice for bird-lime. The bark of *Antiaris toxicaria* is used in western India for making sacks, which are formed by cutting a branch of the dimensions of the sack wanted, and simply turning back and drawing off the bark after it has been soaked and beaten, the wood being sawn off so as to leave a little portion to form the bottom of the sack.

Artois, an old province in the north of France, bounded by Flanders and Picardy, and almost corresponding with the modern department of Pas-de-Calais. Its capital was Arras. Louis IX. in 1237 made Artois a county, and gave it to his brother Robert. Afterwards it passed into the hands of Flanders and Burgundy, but was ceded to France by treaties in 1659. Charles X., in his early life, and also after his abdication, was known by the title of Comte d'Artois.

Arts, or 'Liberal Arts,' a term technically applied to certain studies, came into use during the middle ages, and on the establishment of universities the term 'Faculty of Arts' denoted those who devoted themselves to Science and Philosophy, as distinguished from the faculty of Theology, and afterwards of Medicine and Law. The number of 'Arts' embraced in the full medieval course of learning was seven: Grammar, Dialectic, Rhetoric (constituting the *Trivium*), Music, Arithmetic, Geometry, and Astronomy (the *Quadrivium*). The terms Master and Doctor were originally applied synonymously to any person engaged in teaching. In process of time the one was restricted to the liberal arts; the other to Divinity, Law, and Medicine. See DEGREES, UNIVERSITY.

Artsibashev, MIKHAIL PETROVICH (1878–1927), Russian novelist and dramatist, was a Tatar with Russian, French, Georgian, and Polish blood in his veins, and a great-grandson of Kosciusko. His *Sanin* (1909), *Breaking Point* (1915), and other erotic pessimistic stories have been translated—*The Millionaire* with autobiography (1915).

Art Unions, associations having for their object the promotion of an interest in the fine arts, and a more liberal patronage of them by the public. Though the origin of these unions seems to belong to the French, it was the Germans who fostered and developed them into the important aids to art they afterwards became. The Art Union of Munich was formed in 1823, and within ten years of that date nearly every town of any consequence in Germany had one. Many of the German associations also directed their attention to the formation and encouragement of permanent galleries of art and other kindred objects, that of Cologne greatly assisting in the completion of its celebrated cathedral.

The first union in Britain was established in Edinburgh in 1834, at which time the patronage of

the fine arts had reached such a low ebb that, excluding portraits, the amount expended in the purchase of pictures in the Scottish Academy's annual exhibition was sometimes as low as £35, and never more than £300. The success of the association was immediate, and to its founders the public are in no small degree indebted for the rapid progress that ensued. It acted after the example of the German unions in purchasing important works of art for the permanent National Gallery. Similar associations immediately followed in London and Dublin. These associations are nearly all constituted alike, and consist of any number of persons paying a certain sum towards a fund, which, after deducting necessary expenses, is mainly devoted to the purchase of works of art for distribution as prizes to the subscribers.

The distribution is effected on the lottery principle, but a diversity of practice exists in the method of expending the funds. Firstly, the method common on the Continent, and adopted in Edinburgh, consists in putting, year by year, the whole sum to be devoted to the purchase of works of art into the hands of a committee chosen for their supposed taste in such matters, and requesting them to purchase pictures and other works of art for distribution by lot to the subscribers. Secondly, the plan followed by the London Art Union is to distribute the money itself by lot, and to insist on the prize-holders expending their prizes in pictures, selected by themselves, from certain exhibitions. If the object of the associations is to cultivate a taste for higher art than exists in the general community for the time being, then the first method is doubtless the true one.

The weak point of art unions is the expense of management, which in some cases is a very high percentage of the total sum subscribed; and it may even be doubted whether, now that the patronage of art has grown to its present dimensions, they have not outlived their usefulness.

The difficulty of distinguishing between the lottery as part of the art union, and lotteries of an unquestionably illegal kind, led in 1846 to the passing of a special act for legalising *bona-fide* art unions, maintained solely for the encouragement of art. Unions, however, to be legal, must be incorporated by royal charter, or the instrument constituting the association and their rules be previously approved by the Privy-council.

Artvin, a town of Turkish Armenia on the Charuch, 34 miles S. of Batum; pop. 8000.

Aru. See ARRU.

Aruba, an island of the Dutch West Indies; area 69 sq. m., pop. 9400. See CURAÇAO.

Arum, a genus of spathifloral monocotyledons, belonging to the family Araceæ. This family is chiefly tropical, and comprises a great number of species—herbaceous plants, some of which are stemless; shrubby plants, some of which are aborescent; and plants which climb by aerial roots, clinging to the trees of tropical forests. The leaves are sheathing at the base, convolute in bud, usually with branching veins. The small degenerate flowers are crowded upon the elongated axis or *spadix*, which is generally inclosed by a large bract or *Spathe* (q.v.), frequently coloured or white: the male flowers are aggregated at the upper part of the spadix, and the female flowers towards its base. In some species, a stench like that of carrion is produced during flowering, as well as a remarkable degree of heat. Plants are of course slightly warmer than the air around them, the heat being produced by the breaking up and oxidation of their protoplasm, and by the true respiration, in short, which goes on in all living tissues (see ANIMAL HEAT); but flowers, in general, are only 1° or 1½° warmer than the air, whereas the flowers of some of the Arums and nearly allied plants are sensibly warm to the touch, and that of *A. cordifolium* has been found to have a heat of 121° F., when that of the air was only 66° F.—The only British species is *A. maculatum*, Cuckoo-pint, Lords and Ladies, or Wake-Robin, abundant in England and most parts of Europe, growing chiefly in moist shady woods and under hedges. It has a tuberous perennial root; its leaves are all radical, on long stalks, strongly arrow-shaped, often spotted; the spathe greenish yellow, inclosing a rather short violet or brownish-red spadix. It produces scarlet berries, 1–2 seeded, about the size of peas, clustered upon the spadix. The root has a burning acrid taste, which, however, it loses in drying or boiling. In a fresh state, it is a drastic purgative, too violent for medicinal use; and, indeed, it, as well as the leaves, is an active poison; yet a nourishing farina is prepared from it, after the acrid juice has been removed. This farina is a pure starch, and is known in England by the name of Portland Sago or Portland Arrowroot. It was formerly prepared to a considerable extent in the Isle of Portland, where also the tubers (corms) themselves were eaten by the country-people. They lose great part of their acridity in drying, and were formerly used in medicine as a stimulant in impaired digestion, a diuretic in dropsies, and an expectorant in chest complaints. The plant is cultivated in India for food.—*A. indicum* is also cultivated in Bengal for its esculent stems and small pendulous tubers.—Acridity in the juice, and the presence of an abundant and nutritive store of starch, from which the acrid juice is easily separated, are characteristics of many plants of this order, particularly species of Caladium and Colocasia, much used for food in warm countries, under the names Cocco (q.v.), Taro (q.v.), &c.—*Amorphophallus campanulatus* (*A. campanulatum*), called Ol by the Bengalese, is cultivated in some parts of India for its corms, which form a very important article of food; yet in a fresh state it is so acrid that it is employed as an external stimulant. The peculiar acridity of the order is most remarkably displayed in *Dieffenbachia*, the Dumb Cane (q.v.).—Two large species of Arisæma, another genus very closely allied to Arum, were found by Sir J. Hooker to afford food to the inhabitants of the Sikkim Himalaya at an elevation of upwards of 10,000 feet. Their tuberous roots are bruised by means of wooden pestles, and thrown into small pits with water, until the commencement of acetous fermentation, when the acridity is mostly dissipated; but the process is so imperfect that cases of injury from the poisonous juice are frequent. The tubers of *Arisæma atrorubens*, a native of the United States, and there known as Dragon-root and Indian Turnip, yield a pure white starch like that of *A. maculatum*.—The Dragon-plant, *A. Dracunculus*, a native of the south of Europe, is sometimes seen in gardens in Britain, despite its carrion-like smell.—The so-called 'Lily of the Nile,' so commonly used as a decorative plant in this country on account of its white spathes and large leaves, is *Richardia* (*Calla*) *æthiopica*.

Arum maculatum: A, flower-stalk within bract or spathe; B, flower-stalk without spathe.

Ar'undel, an ancient municipal borough (till 1867 also parliamentary) of Sussex, on the navigable Arun, 5 miles from its mouth, and 10 miles E. of Chichester. Arundel Castle, the seat of the Fitzalans, Earls of Arundel, from 1243 to 1580, and since then of the Howards (q.v.), comprises a circular Norman keep, 100 feet high, and a modern Gothic edifice dating from 1791. It has stood three great sieges, in 1102, in 1139, and in 1644. The cruciform parish church (1387) has its choir cut off from the nave by a brick wall. The Duke of Norfolk's proprietary claims over this choir, called the Fitzalan chapel, but really a collegiate church, were vainly contested in 1879–80. The splendid Roman Catholic church (1873) was erected by the Duke of Norfolk at a cost of £150,000. Pop. 3000. See Tierny's *Arundel* (1834), and Freeman's *English Towns* (1883).

Arundel, THOMAS, Archbishop of Canterbury, was born in 1353, the third son of Robert Fitzalan, Earl of Arundel. In his twenty-first year he was raised from the archdeaconry of Taunton to the see of Ely; in 1388 he was translated to the archbishopric of York, and in 1396 to that of Canterbury. Banished by Richard II. (1397), he helped to seat Henry of Lancaster on the throne (1399); but he is chiefly remembered as a bitter opponent of the Lollards, two of whom were burned by him in 1401 and 1410. He died 19th February 1413.

Arundel Marbles, part of a collection of ancient sculptures, purchased in 1624 at Smyrna and elsewhere by Thomas Howard, Earl of Arundel (1586–1646), and presented in 1667 to the university of Oxford by his grandson, Henry Howard, afterwards Duke of Norfolk. Its gem is the 'Parian Chronicle,' consisting of fragments of a marble inscription, supposed to have been executed in the island of Paros about 263 B.C. In its perfect state this inscription contained a chronological table of the principal events in Grecian history from 1582 to 264 B.C. The chronicle of the last ninety years is lost, and the extant portion of the inscription is much corroded and defaced. The 'Arundel Society' (1848–97), for promoting the knowledge of art, commemorated the name of the Earl of Arundel; its facsimiles and photographic reproductions are famous.

Arundo. See REED.

Aruwimi is the name of an important tributary of the Congo, entering the latter from the north in 1° 10′ N. lat., 23° 30′ E. long. It was explored for 100 miles by Stanley in 1883, and by it Stanley advanced to the relief of Emin Pasha in 1887. For a time it was maintained by some that the Aruwimi was the lower course of Schweinfurth's Welle, now known to enter the Congo by the Mobangi far to the west. See CONGO, AFRICA.

Arvad (Gr. *Arados*), an ancient city of Phœnicia, occupying a small island barely a mile in circumference, 2 miles from the coast, near the mouth of the river Eleutherus. It is said to have been founded by the Sidonians, and was famed for the seafaring skill of its inhabitants.

Arval Brethren (*Fratres Arvales*), a college of twelve priests in ancient Rome, who yearly made offerings to the field Lares for the increase of the fruits of the field. Its institution was ascribed to Romulus, from which we may at least argue its extreme antiquity. Niebuhr suggested that it was originally connected with the Latin element of the Roman state, just as its sister college, that of the *Sodales Titii*, was confessedly instituted for the purpose of keeping up the specially Sabine religious rites. The office was held for life—its badge was a chaplet of ears of corn worn on the head with a white band. One account of the ceremonies at their principal festival, that of three days in honour of Dea Dia, supposed to be Ceres, is preserved in an inscription written in the first year of the Emperor Elagabalus (218 A.D.). The same inscription contains a hymn, which appears to have been sung at the festival from the earliest times. Later inscriptions show that the college was still in existence about the middle of the fourth century.

Arve, a mountain stream rising in the Col de Balme, one of the Savoyan Alps, and flowing through the Vale of Chamouni into the canton of Geneva, below which town it joins the Rhone, after a course of 62 miles.

Arveyron, a small tributary of the Arve, in Savoy, is the outlet of the famous *Mer de Glace*, in the valley of Chamouni, from which it issues in a torrent through a beautiful grotto of ice, from 40 to 150 feet in height, known as the 'Ice-gates of the Arveyron.' Its course is short, and it joins the Arve on its right bank, some distance above Chamouni.

Arvic'ola. See VOLE.

Ar'yans and Aryan Languages. The name Aryan (less properly, Arian) has, since about 1845, been used to designate the ethnological division of mankind otherwise called Indo-European or Indo-Germanic. That division consists of two branches, geographically separated, an eastern and a western. The western branch comprehends most of the inhabitants of Europe, with the exception of the Turks, the Magyars of Hungary, the Basques of the Pyrenees, and the Finns and Lapps; the eastern comprehends the inhabitants of Armenia, of Persia, of Afghanistan, and of Northern Hindustan. The evidence on which a family relation has been established among these nations is that of language. Between Sanskrit (the mother of the modern Hindu dialects of Hindustan), Zend (the language of the ancient Persians), Greek (which is yet the language of Greece), Latin (the language of the Romans, and the mother of the modern Romanic languages—i.e. Italian, French, Spanish, Portuguese, Rumanian), Celtic (once the language of great part of Europe, now confined to Wales and parts of France, Ireland, and Scotland), Gothic (which may be taken as the ancient type of the Teutonic or Germanic languages—including English and Scandinavian), and Slavonic (spoken in a variety of dialects all over the east of Europe and a great part of the south-east), the researches of philology within the 19th century established such affinities as can be accounted for only by supposing that the nations who originally spoke them had a common origin. No one of these nations, existing or historical, can claim to be the parent nation of which the others were colonies. The relation among the languages mentioned is that of sisters—daughters of one mother, which perished, as it were, in giving them birth. No monuments of this mother-language have been preserved, nor have we any history or even tradition of the nation that spoke it. That such a people existed and spoke such a tongue is an inference of comparative philology, the process of reasoning being analogous to that followed in the kindred science of geology. The geologist, interpreting the inscriptions written by the finger of Nature herself upon the rock-tablets of the earth's strata, carries us back myriads of ages before man appeared on the scene at all, and enables us to be present, as it were, at creation itself, and see one formation laid above another, and one plant or animal succeed another. Now languages are to the ethnologist what strata are in geology; dead languages have been well called his fossils and petrifactions. By skilful interpretation of their indications, aided by the light of all other avail-

able monuments, he is able to spell out, with more or less probability, the ethnical records of the past, and thus obtain a glimpse here and there into the gray cloud that rests over the dawn of the ages.

When these linguistic monuments are consulted as to the primitive seat of the Aryan nations, they point to Central Asia, somewhere probably east of the Caspian, and north of the Hindu Kush and Paropamisan Mountains. There, at a period long anterior to all European history—while Europe was perhaps only a jungle, or, if inhabited at all, inhabited by tribes akin to the Finns, or perhaps to the American Indians—dwelt that mother-nation of which we have spoken. From this centre, in obedience to a law of movement which has continued to act through all history, successive migrations took place towards the north-west. The first swarm formed the Celts, who seem at one time to have occupied a great part of Europe; at a considerably later epoch came the ancestors of the Italians, the Greeks, and the Teutonic peoples. All these would seem to have made their way to their new settlements through Persia and Asia Minor, crossing into Europe by the Hellespont, and partly, perhaps, between the Caspian and the Black Sea. The stream that formed the Slavonic nations is thought to have taken the route by the north of the Caspian. At a period subsequent to the last north-western migration, the remnant of the primitive stock would seem to have broken up; part poured southwards through the passes of the Himalaya and Hindu Kush into the Punjab, and became the dominant race in the valley of the Ganges; while the rest settled in Persia, and became the Medes and Persians of history.

It is from these eastern members that the whole family takes its name. In the most ancient Sanskrit writings (the Veda), the Hindus style themselves Âryas; and the name may be preserved in the classic Arii, a tribe of ancient Persia, and in the district Ariana. Airyana is evidently an old Persian word, preserved in the modern native name of Persia, Airan or Iran. *Árya*, in Sanskrit, signifies 'excellent,' 'honourable,' originally, 'lord of the soil,' from a root *ar* (Lat. *arare*, 'to plough'), distinguishing tillers (*earers*) of the earth from the nomadic Turanians. Some limit the word *Aryan* to the eastern section of the Indo-European stock.

Max Müller has drawn a picture of the Aryan family while yet one and undivided, in which the state of thought, language, religion, and civilisation is exhibited in a multitude of details. Where the same name for an object or notion is found used by the widely spread members of the family, it is justly inferred that that object or notion must have been familiar to them while yet resident together in the paternal home. It is in this way established, that among the primitive Aryans not only were the natural and primary family relations of father, mother, son, daughter, hallowed, but even the more conventional affinities of father-in-law, mother-in-law, sister-in-law; that to the organised family life there was superadded a state organisation with rulers or kings; that the ox and the cow constituted the chief riches and means of subsistence; and that houses and towns were built.

One general observation made by Max Müller is so interesting that we quote it entire. 'It should be observed,' he says, 'that most of the terms connected with chase and warfare differ in each of the Aryan dialects, while words connected with more peaceful occupations belong generally to the common heirloom of the Aryan language. The proper appreciation of this fact in its general bearing will show how a similar remark made by Niebuhr, with regard to Greek and Latin, requires a very different explanation from that which that great scholar, from his more restricted point of view, was able to give it. It will show that all the Aryan nations had led a long life of peace before they separated, and that their language acquired individuality and nationality as each colony started in search of new homes—new generations forming new terms connected with the warlike and adventurous life of their onward migrations. Hence it is that not only Greek and Latin, but all Aryan languages, have their peaceful words in common; and hence it is that they all differ so strangely in their warlike expressions. Thus the domestic animals are generally known by the same name in England and in India, while the wild beasts have different names, even in Greek and Latin.'

In this mainly pastoral life, the more important of the primitive arts were known and exercised: fields were tilled; grain was raised and ground into meal; food was cooked and baked; cloth was woven and sewed into garments; and the use of the metals, even of iron, was known. The numbers as far as a hundred had been named, the decimal principle being followed. The name for a thousand had not come into requisition until after the dispersion, for it differs in the different Aryan tongues.

The Aryan religion consisted in a worship of natural objects and phenomena, more especially of the sun and dawn, and other bright powers of day; but it was *henotheistic* rather than polytheistic, as out of the many gods he believed in, the worshipper prayed to one only at a time. The gods ruled the world, dwelling like a human family with the *dyauspitar* (*Diespiter*) at their head. This 'father of heaven' was the 'bright' sun, the stars and moon were his sons and daughters. Fragments of the hymns addressed to the gods, framed while abstract language did not yet exist, and every word was a metaphor, originated those stories of gods, heroes, and monsters, which, with more or less of variety, but still with a family likeness, formed the primitive mythology of every member of the group. Curious parallels, however, between Aryan mythology and that of savage races not ethnologically connected with the Aryan have been pointed out by Lang and others, and have given rise to discussion whether these are due to transmission, or to the essential identity in the working of the human mind at equal levels of culture.

The theory of the European origin of the Aryans, advanced by Omalius d'Halloy in 1839–44, and by Latham (q.v.) in 1862, was supported by Spiegel and Benfey, and finds many adherents. See Poesche, *Die Arier* (1878); Penka, *Herkunft der Arier* (1886); Schrader, *Prehistoric Antiquities of the Aryans* (trans. by Jevons, 1890); and Isaac Taylor, *The Origin of the Aryans* (1889). Some European languages would then be truer representatives of the old Aryan tongue than the Indic ones. The original home of the Aryans would be Scandinavia, or the neighbourhood of the Baltic; and the Aryan himself, a coarse nomad, without metals, clothed in skins. Poesche assumes that the Aryan languages were the product of the white race, whose colour was due to the albinoism caused by a long residence in the marshy country between the Niemen and the Dnieper. But as Sayce points out, the weight of evidence from comparative philology is against other than an Asiatic cradle for the Aryan tongue. The parent-speech need not have been one undivided uniform tongue, but may already have been split up into dialects, like the provincial Latin that developed into the Romanic languages of modern Europe. Though the original Aryan people may have been living together north or north-west of the Black Sea shortly before their dispersion, it does not follow that that region was their original home. The recent discovery of traces

of a hitherto unknown Indo-European language—that of the Tochari—in East Turkestan yet remains to bear fruit.

See Sayce's *Introduction to the Science of Language* (new ed.); Schrader's *Reallexikon der Indogermanischen Alterthümer* (1901) and *Die Indogermanen* (1910); Sigmund Feist's *Kultur, Ausbreitung, und Herkunft der Indogermanen* (1913); Bender's *Home of the Indo-Europeans* (1922); also ETHNOLOGY, PHILOLOGY, MYTHOLOGY.

Arya Samaj, an important school or association of Hindu religious and social reformers, claims, unlike the eclectic Brahma Samaj, to be based on the Vedas as the source of Divine revelation. The founder, Swami Dayananda Saraswati (1824–83), was the son of a landholder, money-lender, and revenue-collector in Kathiawar, who was early initiated into his father's Saivite faith (see SIVA); but, becoming dissatisfied with idolatry, passed through various stages of ascetic or sunyasi ere in 1875 he founded at Bombay the first Arya-Samaj. He claimed to find in the Vedas not merely rules of life but all that was essential in modern science. On the other hand, he did not find that the Vedas sanctioned idolatry or caste, and these the society aims at abolishing, as well as at securing marriage reform, cleanliness, female education, abstinence from alcohol and animal food. On special occasions the Aryas even perform the ancient Vedic 'hom' sacrifice. In patriotic antithesis to the Brahma Samaj also, they are hostile to Western thought and culture generally, and, becoming more and more political, have been largely associated with the Nationalist movement—some of them with anti-English and anti-European agitation. Their numbers were given by the census of 1921 at 467,578, but are probably not fully revealed by the official figures. See books by Lillingston (1901) and Lajpat Rai (1915).

As was the designation both of a Roman weight (called also *libra*) corresponding very nearly to an English *pound*, and also of a coin made of the mixed metal *aes*, or bronze, which originally no doubt weighed a (Roman) pound, of the value of about 8¼d., and took the form of a bar. Later there were thirty-six coins (*asses*) or more to the pound, and the value decreased correspondingly. Under Augustus it was worth a little less than ½d. See SESTERTIUS.

A'sa, son of Abijah, and third king of Judah (956–916 B.C.), strove zealously for the purity of religion, and to strengthen the defences of his kingdom. He repelled with immense slaughter an Egyptian invasion, and waged successful war against Baasha, king of Israel, with the aid of the Syrian monarch, Benhadad.

Asa Dulcis (i.e. Sweet Asa), a synonym of Benzoin (q.v.). This name was applied to the gum-resin when it began to be imported into Europe in the early part of the 16th century.

Asafœ'tida, or ASSAFŒTIDA (i.e. Fetid Asa or Assa), is a gum-resin, which has been supposed to be identical with the exuded juice of the *Silphion* of Dioscorides, so highly esteemed among the Greek physicians. Its name is derived from the Persian word *azā*, 'mastic.' The drug is procured by drying the milky juice which flows from the root of the plant *Ferula* (*Narthex*) *asafœtida*. The root of the asafœtida plant is long, and generally undivided; white inside, but having a black covering; and contains in its interior a quantity of juice of an overpowering odour, which much resembles that of garlic. *Ferula* or *Narthex asafœtida* has its radical leaves tripartite, their segments bipinnatifid, and nearly two feet in length.

Asafœtida is prepared in the dry southern provinces of Persia, but chiefly in Khorasan and Afghanistan, and also to the north of the Hindu Kush range of mountains. About April, the root-leaves are taken away, and the root itself is more or less exposed by removal of the soil from about it. After a lapse of six weeks, a slice is cut horizontally from its summit, this operation being repeated at intervals of a few days till the root is exhausted, and a thick white juice exudes, the smell of which even exceeds in strength that of the drug when dry. The drug is sometimes met with in the market in the form of tears, but more frequently in lumps, which are made up of irregularly shaped tears, agglutinated together by a softer substance. Asafœtida is used in medicine, and possesses stimulant and anti-spasmodic properties. When taken internally, it undergoes absorption, and may be detected in almost every secretion of the body, as the saliva, breath, and urine. According to the analysis of Pelletier, asafœtida is composed of the following substances: resin, 65 parts; volatile oil, 3·6; gum, 19·44; bassorin, 11·66; various salts, ·30. In many parts of the East, this drug is used as a condiment, in which respect it seems to take the place of the garlic of some European nations.

Ferula asafœtida.

Asaphus. See TRILOBITE.

Åsar is the Swedish name given to long winding banks and ridges of gravel and sand, which occur abundantly in the low grounds of Sweden. They often run continuously for more than 100 miles—sometimes one dominant ridge being joined by many tributary ridges, just as a river by its affluents. They are believed to have been formed underneath the great *mer de glace* which covered Sweden during the Glacial Period (q.v.), and to mark the site of sub-glacial streams and rivers. Similar gravelly ridges occur in Ireland, where they are called *esker*, and in Scotland, where they are called *kames*—a name which has been applied to similar gravelly accumulations which occur in the northern states of the American union.

Asarabacca (*Asarum europæum*), a plant of the family Aristolochiaceæ (see ARISTOLOCHIA), a native of Europe, growing in woods; but rare (an escape from cultivation) in Britain. The whole plant has acrid properties; the root-stock and leaves are aromatic, purgative, and emetic, and were formerly considerably used in medicine, especially in the preparation of snuffs used in the treatment of catarrh, &c.—A nearly allied species, *A. canadense*, a native of Canada, is stimulant and

Asarabacca (*Asarum europæum*).

diaphoretic, and is used, under the name of Canada Snakeroot, instead of *Aristolochia Serpentaria*. It is also called Wild Ginger, and used as a spice, being of a warm aromatic quality, and not acrid like its European congener.

Asben. See AÏR.

Asbes'tos, a mineral of a fine fibrous character, the fibres sometimes combined together in a compact mass, sometimes easily separable, elastic and flexible. It is generally of a whitish or greenish colour, and has a silky or vitreous lustre. The variety called 'rock-cork' much resembles cork, is soft and easily cut, and so light as to swim in water. 'Mountain leather' and 'rock-wood' are not so light. Another variety is called 'mountain paper.' The finest fibrous variety, with easily separable fibres, is called *Amianthus* (from a Greek word 'unpolluted,' as *asbestos* is 'indestructible'), because cloth made of it was cleansed by passing it through fire, and was used, it is said, by the ancients to enwrap dead bodies placed on the funeral pile, so as to preserve the ashes of the body unmixed. Asbestos is a mineral of the Amphibole (q.v.) group. The name is also applied to a kind of Serpentine (q.v.) and sometimes to a Pyroxene (q.v.). Most of what was formerly used in the arts was amphibole or pyroxene, the main supply for long being amphibole from Corsica and Italy. The bulk of what is now produced is serpentine, like that of Quebec province in Canada, first obtained in 1877. Canada produces the greater part of the world's supply. Asbestos is worked in a number of the states of the American Union, in Italy, Tyrol, Australia, and New Zealand; and is found in North Wales, Ireland, Shetland, and the north of Scotland; 'Cape asbestos' from Griqualand West is Crocidolite (q.v.). Asbestos is now applied to many and very various purposes. It is largely employed in the form of cloth or canvas as a filtering medium for corrosive liquids, while as millboard or cardboard it has an extensive application in the form of washers for fire or acid proof joints. Steam stopcocks are now constructed in which the key or plug works in a chamber closely packed with fibrous asbestos; while for all kinds of engine joints, boiler manholes, and similar situations, the imperishable nature of asbestos renders it specially valuable. It has recently come into extensive use in the construction of gas fires. At first the coarser varieties only were used, being ground to powder, and then made into balls of a reddish-brown colour by means of fireclay. These being heated by some form of Bunsen-burner (q.v.), became red-hot, and radiated out a large proportion of heat. Later inventors, however, tend to use the filamentous white variety, in combination with a network of iron, for the purpose of producing a more cheery fire, the thin fibres being readily raised to a white heat. Mixed with cement it is used for building and roofing purposes, for gas and water pipes, and as a substitute for pottery and tins. Asbestos paint has been much used to render wooden buildings more or less fully fireproof, but it is apt to peel off. Wood treated in this way does not burst into flame, but only smoulders away under the influence of heat. As a non-conductor of heat, asbestos has valuable properties; a sheet of it placed on a table enabling red-hot vessels to be put down without danger. It is used for so many and various purposes as packing for all classes of machinery, fire-escapes, firemen's clothing, furnacemen's gloves, fireproof putty, sheeting, boiler and steampipe covering, millboard for every purpose, paper, cloth for filtering acids and other similar uses; for covering rollers in print-works (where aniline dyes are employed, and it is necessary to resist heat and the action of the acids); for flooring-felt, roofing-felt, and wall-felt, more especially in timber-built houses; as a lubricant for every kind of engine; for portable fireproof safes, and for lamp-shades; for curtains in theatres; as a non-conductor in electrical work, as tubing for covering telegraph wires, and for electricians' gloves. Asbestos paper, printed with a pattern, has been used to cover wooden partitions. In its manufacture the lumps of crude asbestos are put through an ingenious crushing-machine, whose rollers have a parallel motion in addition to their rolling action over each other. This action effectually opens out the fibres, which are then boiled in large tanks. The shorter fibres having been ground down and reduced to a pulp, are converted into asbestos millboard by manipulation on gauze netting. The longer fibres on leaving the crushing-machine are woven into yarn and cloth in looms.

Asbjörnsen, PETER CHRISTIAN, one of the most popular among Norwegian authors, was born 15th January 1812 at Christiania. He studied at the university in his native city, then found in the leisure of a four years' residence as a tutor in the country the opportunity to learn thoroughly the life of the common people. In long journeys on foot he collected a rich store of popular poetry and folklore. On his return to the capital he devoted himself to the study of medicine and the natural sciences, and from 1846 to 1853 he explored and dredged, at government expense, various parts of the Norwegian coast, without neglecting the while any opportunity of prosecuting his favourite study. In the years 1849–50 he accompanied a Norwegian ship of war to the Mediterranean, and from 1856 to 1858 he studied forestry at Tharandt in Saxony. Appointed inspector of forests for the Trondhjem district in 1860, he was sent by government in 1864 to investigate the manufacture of peat in Holland, Germany, and Denmark. On his return he was appointed to take measures for its better manufacture among the peasantry, and he resigned this office only in 1876. He died at Christiania, 6th January 1885. Asbjörnsen lived a busy and useful life, and wrote many scientific and practical books on such subjects as natural history, forestry, peat-manufacture, marine fauna, and sensible cookery; but it is not by these, but by his inimitable collections of folk-tales, that his name will be remembered. He first opened the eyes of his countrymen to the rich treasures of poetry and quaint folklore that were to be found among simple and honest country-people; and it is hardly too much to say that to his collections is directly due the growth of the national element in Norwegian literature which has since become predominant in the literature, art, and music of the country. He was fortunate in finding for his first collection a coadjutor with almost as fine poetic sympathy as himself, Jörgen Moe, afterwards Bishop of Christiansand, and one of the most considerable poets of his time. The two friends published in 1842 the first series of *Norske Folkeeventyr* ('Norwegian Folk and Fairy Tales'), in the vernacular of the country. Asbjörnsen alone published in 1845 the first series of his *Norske Huldreeventyr og Folkesagn*, consisting of stories about the *Huldre*, or fairy of the Norwegian woods, with bright descriptions of the natural scenery and of the characteristic life of the peasantry. Three years later (1848) appeared a second collection; and in 1871 he published also a second volume of the *Folkeeventyr*. These books are now classics in their native literature, and have a place on the shelves of folklorists in all countries. They have been translated into most European languages; into English by Sir George W. Dasent in *Popular Tales from the Norse* (1859), and *Tales from the*

Fjeld (1874); and by H. L. Braekstad in *Round the Yule Log* (1881).

Asbury, Francis, the first Methodist bishop consecrated in America, was born at Handsworth in Staffordshire, August 20, 1745. When sixteen years old he became an itinerant Wesleyan preacher, and in 1771 he was sent as a missionary to America, where he was consecrated in 1784. During a long life of almost incessant labour, it is estimated by his biographer that he travelled about 270,000 miles (mostly on horseback), preached about 16,500 sermons, and ordained more than 4000 preachers. Of great natural ability and indomitable energy, he ranks with Wesley, Whitefield, and Coke in the Methodist movement of his time. He died at Richmond, Virginia, March 31, 1816.

As'calon, or Ashkelon, one of the five chief cities of the ancient Philistines, lying north of Gaza, on the Mediterranean. It was strongly fortified, had a shrine of the Syrian fish-goddess Derketo, and was the birthplace of Herod the Great. In Solomon's time it was tributary to the Jews; later it became independent, and its kings often kindled the wrath of the prophets. Under the Romans it was a kind of republic, and afterwards the seat of a Christian bishop. The Arabs took it in 637. Before its walls in 1099 the Crusaders, under Godfrey de Bouillon, gained a decisive victory. Recaptured by the Moslems, it was retaken, after a five months' siege, in 1157, by Baldwin III. It was dismantled by Saladin in 1191, and completely demolished in 1270 by Sultan Bibars. The name of this ancient city is preserved in the *Eschalot* or *Shallot*, a favourite kind of onion, first grown in the fertile plains around.

As'caris, a genus of parasitic worms in the Nematode or Thread-worm (q.v.) order. *Ascaris lumbricoides* is one of the four thread-worms not infrequently infesting man, and especially children. It occurs in the intestine, whence it occasionally works its way into other parts of the body. The thin cylindrical body measures from 6 to 10 inches in length, is of a whitish or light-yellow colour, and is pointed at both ends. The surface of the transparent skin is somewhat wrinkled, but there are no internal segments. The sexes are separate, and the less frequent males are distinguished by their turned-up posterior extremity, and the presence of two copulatory spicules. The skin is strong and protective, and forms three lips round the mouth. The muscular system is well developed, and the name Ascaris (Gr. *askarizō*, 'to jump') probably refers to the lively motions of some forms. The eggs develop in water or damp earth, and it seems probable that the embryos are directly swallowed by man. This troublesome though rarely dangerous parasite is best dealt with by means of expulsive purgatives. Care as to the purity of drinking-water, and thorough cleaning of vegetables eaten raw, are evident preventive precautions. See Parasitic Animals, Round-worms, Thread-worms.

A, posterior end of female; B, posterior end of male.

Ascension, a solitary island nearly in the middle of the South Atlantic, 685 miles NW. of St Helena, in 7° 57′ S. lat., and 14° 21′ W. long. It is said to have received its name from having been discovered by a Portuguese navigator on Ascension-day, 1501. It is 7½ miles long by 6 broad, its area being 35 sq. m. First occupied by the English in 1815, in connection with Napoleon's detention on St Helena, it is now used only as a sanatorium, having ceased since 1887 to be a coaling depôt. Like St Helena, it is of volcanic origin, being one of the peaks of a submarine ridge which separates the north and south basins of the Atlantic. It rises in the Green Mountain to a height of 2870 feet. The water-supply is drawn from this mountain at a great height above sea-level. The climate is dry and healthy. Several acres of land have been brought under cultivation. Young trees, shrubs, furze, grasses, and hardy plants have been planted; and a number of sheep and cattle are reared. European vegetables are grown, besides the tomato, castor-oil plant, and pepper. Turtles are very abundant. Several astronomers and savants have visited Ascension, from Halley in 1677, to Darwin, Sir Wyville Thomson, and Sir David Gill. The population is about 250. Until 1922, when it was handed over to the Colonial Office and annexed to St Helena, it was under the control of the Admiralty, and persons born in it were deemed to be born at sea and registered in the parish of Wapping. See Lady Gill's *Six Months in Ascension* (1879).

Ascension, Right, the name given in astronomy to one of the arcs which determine the position relatively to the equator of a heavenly body on the celestial sphere, the other being the declination (see Armillary Sphere). It meant originally the difference of time of rising of the first point of Aries (q.v.) and the heavenly body referred to, on a *right* sphere. Hence it is called *Right* Ascension. The sphere of the heavens would be *right* if the poles were on the horizon, as is the case at the earth's equator. At all other places, the axis of the celestial sphere is *oblique*—i.e. inclined to the horizon—so that the right ascension of a star gives no *direct* knowledge of its rising time except there. The term right ascension has thus passed into general use as meaning simply the arc of the equator intercepted between the first point of Aries, and the point at which the circle of declination passing through the star cuts the equator. Measured always from west to east, right ascension on the heavens corresponds to longitude on the earth. The right ascension of a heavenly body is ascertained by means of the transit instrument and clock. The transit instrument determines its meridian passage, and the transit clock gives the time at which this takes place. When the first point of Aries is in the meridian, the clock stands at 0 hours, 0 minutes, 0 seconds, and it is so arranged as to indicate 24 sidereal hours, the time that elapses between two successive passages of that point. The reading of the clock, therefore, at the passage of any heavenly body gives its right ascension in time, and this, when multiplied by 15, gives the same in degrees, minutes, and seconds. The right ascension is usually given, however, in time. The old term, *oblique* ascension, was given to the right ascension of the point of the equator that rose simultaneously with the heavenly body; and the difference of the oblique and right ascension was called the 'ascensional difference.'

Ascension-day, or Holy Thursday, one of the great festivals of the church, held on the fortieth day after Easter, to commemorate the ascension of Christ into heaven. Its institution dates from the 4th century. The Church of England appoints special psalms for it, and particularly recommends it as a fitting day for the receiving of the communion. Connected with the religious observances of the day were certain civic ones, which in some parts of England and Scotland are continued to this day—viz. *beating the bounds*, or *riding the marches*, though their

religious connection is apparently forgotten. See ROGATION DAYS, and BOUNDS (BEATING THE).

Asceticism. Among the Greeks, *askēsis* denoted the training gone through by athletes or wrestlers, who had to harden their bodies by exertion and to avoid all sensual and effeminating indulgences. In the schools of the philosophers, especially of the Stoics, the same word signified the practice of mastering the desires and passions; and in this sense it passed into the language of the early Christians. But to understand the vast influence that ascetic ideas have exercised on the Christian religion, we must look beyond the bounds of its history. Their root lies in the oriental notion of the antagonism between mind and matter. The glowing imagination of the oriental carries the practice of asceticism to a monstrous extravagance, as is seen in the frightful self-tortures inflicted by the yogins (see YOGA) and fakirs (see FAKIR), the suicides in the sacred Ganges and otherwise, and the practices formerly prevalent of offering children in sacrifice, and of burning widows (see SUTTEE). Buddhism, which may be considered as a kind of Puritan reformation of the Indian religion, carried the principle beyond its previous bounds. In its contemning the world, in its inculcating a life of solitude and beggary, mortification of the body, and abstinence from all uncleanness and from all exciting drinks, the object was to keep as distant and detached as possible from this 'Vale of Sorrow' (see the article BUDDHISM). The ancient Egyptians sought to confine it to monogamy of the priests, rigid purity, moderate flagellation, and frequent contemplation of death.

It is in this light that we must consider Jewish and Christian asceticism. In the oriental mind, especially in Egypt, circumcision, avoiding of all uncleanness, and fasting, were signs of humiliation before God. Among the Jews, voluntary vows of abstinence, even from lawful food or wine, were practised by prophets and men of special calling, and in certain critical circumstances; but self-castigation continued for long foreign to the sobriety of Judaism, and even hermitism came into established practice only shortly before Christ, in Palestine among the Essenes (q.v.), in Egypt among the Therapeutæ (q.v.).

Asceticism was far less congenial to the reflective nations of the West, above all to the cheerful Greeks. A Greek felt himself as well entitled to enjoyment as his gods; hence Greek religious festivals were pervaded by cheerfulness. The only exception appears to be the Eleusinian mysteries, which never took hold of the people generally, and the passing phenomenon of the Pythagorean fraternity. The attack made by the Socratic school upon the body as the prison of the soul, and the extravagant contempt for the elegances, and even decencies of life, professed by the later Stoics and Cynics, were no genuine fruits of the popular Greek mind; and we must also ascribe to the infusion of oriental philosophy the ascetic tendencies of Neoplatonism, in holding abstinence from flesh and from marriage as chief conditions of absorption into the divinity.

It was into the midst of these ideas that Christianity was introduced. The Jewish converts brought with them their convictions about fasting. Fasting and Nazaritic observances were thought sanctifying preparatives for great undertakings; and the inculcation of abstinence from marriage, on the ground of the expected speedy reappearance of Christ, falls in with the same notion—namely, that the flesh, i.e. the sensuous part of our nature, is the seat of sin, and must therefore, before all things, be rigorously chastened. The spirituality of Christianity, pointing away from earth to heaven, and opposition to the corruption of the heathen world, combined to make the Christians of the 2d and 3d centuries hold aloof from the world and its wisdom, and favour abstinence from marriage, more especially on the part of the clergy. This ascetic spirit began as early as the commencement of the 2d century to court trial in the perilous practice of men and women living together under vows of continence. But during the first three centuries no irrevocable vows yet bound the devotees to a life-long asceticism. Fasting was also comparatively rare.

But the tendency to outward manifestations now began to grow stronger. The inward and spiritual life of the Christians had greatly declined; and if the previous bloody persecutions had driven individuals from human society into the deserts, the growing secularisation of the church, after Christianity became the state religion, had the same effect to a still greater degree. All this paved the way for the chief manifestation of asceticism—namely, monasticism, which the church found herself compelled by the overwhelming tide of opinion within and without to recognise, and to take under her protection and care. From the African Church, represented by Tertullian and Augustine, a spirit of gloomy and crushing supernaturalism spread deeper and deeper over the Western Church generally, intensifying the ascetic tendencies, and leading to still more marked separation from a despised world. There were not wanting healthier minds—as Jovianus and Vigilantius—to raise their voices against fasting and the outward works of asceticism generally; but such protests were vain, and became ever rarer.

From the 11th century, the Cathari, Waldenses, and other sects, though ascetics themselves in a way, yet assailed the external asceticism of the church; and so did Wyclif, Huss, and Jerome of Prague, in their premature struggles at reformation. After a preliminary skirmish by Erasmus, the struggle was decided for a great part of Christendom in the reformation of the 16th century; though the Catholic Church and a section of the Anglican Church still set a high value on various ascetic conditions and exercises—a celibate clergy, the monastic life, fasting and penance. Even the disuse of some of the simple comforts of life, such as the disregard of personal cleanliness, has been regarded as a work of holiness. The fundamental principle that salvation is secured by justification through faith, and not through dead works, struck at the root of monasticism and self-mortification in general. Yet the ascetic spirit often shows itself still alive under various disguises even in Protestantism. The extreme forms of Sabbatarianism have a distinctly ascetic colouring; and hostility to dancing, the theatre, card-playing, and other worldly pleasures (if these are not actually regarded as sinful), may be the outcome of ascetic tendencies. The Mennonites inculcated a rigid asceticism; and with the Shakers (q.v.) of America celibacy is insisted on as a virtue. The essence of asceticism is to hold self-denial and suffering to be meritorious in the sight of God, in and for itself. Many traits presented by Puritanism, Methodism, and Quakerism appear ascetic. It is not impossible that vegetarianism, total abstinence, and other recent austerities, though advocated on other grounds, recommend themselves to the feelings of many from their falling in with this deep-seated propensity to asceticism.

Even in the Catholic Church, ascetic practices have been modified in recent times; fastings are less rigorous, and the self-sacrifice of conventual life is more directed to beneficial ends. Mohammedanism (q.v.) has undergone the same change, but Sufism (q.v.) is carried to the greatest excess

in Persia. In the Greek Church, monasticism had always a milder form. See the articles CELIBACY, FAST, FLAGELLANTS, HERMIT, LENT, MONACHISM, PENANCE, PURITANS, RUSSIA, SABBATH, SHAKERS, STYLITES, TEMPERANCE.

Asch, a town of Bohemia, 14 miles NW. of Eger, with silk, cotton, and woollen manufactures, especially of stockings; pop. 19,500.

Aschaffenburg, a Bavarian town of Lower Franconia, on the right bank of the Main, at the Aschaff's influx, 25 miles SE. of Frankfort. The castle of Johannisburg, a Renaissance pile of 1605–14, with some art treasures, overlooks the whole town. The Romanesque Stiftskirche was restored in 1870–81. There is a reproduction of a Pompeian villa, built for Louis I. in 1842–49. Paper, machinery, and clothes are manufactured, and there is an active river trade. Pop. (1925) 34,056. The Romans built a fortress at Aschaffenburg; and in 976 Otto I., Duke of Swabia and Bavaria, founded the collegiate church, which after his death came into the possession of the Archbishops of Mainz and remained with them until the dissolution of the Germanic empire. In 1814, along with the principality of which it was the capital, Aschaffenburg became Bavarian. Near it the Prussians defeated the Austrians, July 14, 1866.

Ascham, ROGER (sometimes *Askam*), a noted writer and classical scholar, was born in 1515 at Kirby Wiske, near Thirsk, in Yorkshire. He received his early education in the family of Sir Anthony Wingfield, and by him was sent, in 1530, to St John's College, Cambridge, where, in 1534, he took his B.A., and, in spite of his avowed leaning to the Reformed doctrines, obtained a fellowship. The study of the classics, especially Greek, had recently been revived at Cambridge, and Ascham's bent impelled him with ardour to these studies. His reputation as a classical scholar soon brought him numerous pupils; and about 1538 he was appointed Greek reader at St John's. He at first opposed the then new method of pronunciation which is still used in England; but afterwards adopted and defended it. His leisure hours were devoted to music, penmanship (in which he excelled), and archery. In defence of the latter art, he published, in 1545, a treatise entitled *Toxophilus,* the pure English style of which, independently of its other merits, ranks it among English classics. For this treatise, which was dedicated to Henry VIII., he was rewarded with a pension of £10, equivalent to about £100 of our present money. In 1546 he was appointed university orator. In 1548, on the death of his former pupil, Grindal, he was called to supply his place at Cheshunt as tutor to the Lady Elizabeth. In this office he gave the highest satisfaction; but at the end of two years abruptly resigned it, on account of a quarrel with the princess's steward. As secretary to Sir Richard Morysin, ambassador to the court of Charles V., he spent three years (1550–53) on the Continent, at Augsburg chiefly, but with occasional visits to Venice, Tirol, Carinthia; and in 1553 was published his *Report on the Affaires of Germany.* During his absence, he had been appointed Latin secretary to Edward VI.; and on his return, after the young king's death, the interest of Bishop Gardiner secured him the same office under Mary, his pension being at the same time doubled. His prudence and moderation preserved him from offending by his Protestantism; and after Mary's death, Elizabeth retained him at court in the double capacity of secretary and tutor, which offices he held till his death, 30th December 1568. His principal work, *The Scholemaster,* a treatise on classical education, was published in 1570 by his widow, and has been well edited by Professor Mayor (1863). His 295 Latin and English letters were included in Dr Giles's edition (3 vols. 1864–65); and his English works were edited by Aldis Wright (1905). See German monographs by Katterfeld (1879), Weidemann (1900).

Aschersle'ben, a town of Prussian Saxony, on the river Eine, 32 miles SW. of Magdeburg. Pop. (1925) 28,603, occupied in agriculture, gardening, and manufactures of woollens, linens, sugar, machinery, and chemicals. In the vicinity are some ruins, falsely identified as the old castle of Ascania, the original seat of the House of Anhalt.

Ascidians, or TUNICATES, are a class of degenerate survivors of ancestral vertebrates. They were observed and well characterised by Aristotle, but were never really understood till 1866, when the discovery of their complete life-history warranted naturalists in removing them from their random position beside molluscs to the base of the vertebrate series. The larvæ exhibit unquestionable vertebrate characters—viz. a spinal cord, brain, and cerebral eye, a notochord, gill-slits, ventral heart, &c. Except in Appendicularia, however, the vertebrate characters of the larvæ are to a large extent lost in the usually sessile degenerate adult. The tail shrivels up, the notochord and spinal cord disappear, the brain is represented merely by a small ganglion, and the whole symmetry of the body is altered. The ordinary ascidians, the sea-squirts, so called from their power of jerking out water when touched, are common along the coasts of all seas, ranging from low water to twenty fathoms, and usually attached to stones or shells, while some of the more complex forms are free-swimming. Few of them measure separately more than 3 or 4 inches, and most of them decidedly less, but the more or less intimate colonies frequently formed often attain larger dimensions. Chains of free-swimming ascidians sometimes occur several feet in length.

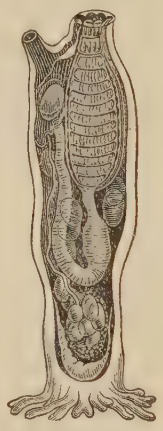


Fig. 1.

Structure of a simple Ascidian, showing inhalent aperture, leading into respiratory pharynx; looped alimentary canal, opening along with genital duct into cloacal chamber; nerve ganglion between inhalent and exhalent apertures; reproductive organs near the base, eggs in body-cavity, &c.; heart at very base; fixing processes. (After Hæckel.)

The following account refers primarily to a simple ascidian, and ought to be prefaced by reading the account of Appendicularia (q.v.), which, as has been noted, retains the larval characters lost in other ascidians. The animal has a double-mouthed flask shape, and is enveloped in a transparent, gelatinous, external sheath, which is secreted by the real skin. This test is remarkable as containing Cellulose (q.v.), the substance which forms the cell-wall of vegetable organisms. Through one of the apertures which are usually fringed with minute lobes, and often bear little coloured spots, the water enters the body; through the other the water, fæces, and reproductive elements are expelled. The anterior region of the alimentary canal forms a large respiratory pharynx, such as also occurs in one worm-like form, Balanoglossus, in Amphioxus (q.v.), and in all vertebrates in the embryonic stage at least. As in Appendicularia, a pair of involutions from the skin meet outgrowths from the gut, and establish a primitive respiratory communication with the exterior. In

the ascidian, however, this simple structure is replaced, as afterwards described, by a multitude of gill-slits opening from the pharynx into a surrounding chamber which communicates with the exterior by a single aperture. The water is drawn in by the mouth, passes through the richly ciliated slits of the pharynx, bathes the blood spread out on the walls, enters the surrounding chamber, and finds its way out by the excurrent orifice. By the same orifice the fæces and generative products reach the exterior. The internal ventral surface of the pharynx exhibits a special groove, which bears cilia and secretes slime. By this means the food particles are caught and wafted along to the beginning of the food-canal proper. The groove, which here forms the nutritive region of the pharynx, is distinctly seen in amphioxus and young lampreys, and seems to be represented by the thyroid gland (see THYROID) of higher vertebrates. The œsophagus, beginning at the lower corner of the pharynx, leads into a stomach provided with a digestive gland, and the intestine loops upwards to end in the cloacal chamber. The pharynx is surrounded by a muscular sheath more or less interrupted. To this the squirting powers are of course due. The nervous system of the adult exhibits no trace of spinal cord; but consists simply of a ganglion lying between the two orifices, and giving off a number of nerves. In the larva the brain has in close association with it an embedded eye, a rudimentary ear, and a ciliated protrusion probably olfactory. The heart differs from invertebrate hearts in being a dilatation of a ventral vessel. It gives off vessels to the respiratory pharynx and other regions, and is remarkable for exhibiting an alternating direction of the circulation, as has also been observed in some worms (Gephyrea). The blood is pumped alternately in opposite directions, at intervals (30 to 200 pulsations) varying with the species and even individual. A closed sac near the respiratory pharynx has been found to contain nitrogenous waste products, and probably represents a kidney. The reproductive organs are usually hermaphrodite, and the testis is sometimes in extremely close association with the ovary. They lie far down in the body, and are often destitute of ducts. When these are present they open, as stated, into the excurrent cloacal chamber. The sex products are not usually ripe at the same time, and self-fertilisation is thus prevented. Asexual reproduction by budding is exceedingly common, and spreading colonies are thus formed. It was in one of the ascidians that the poet Chamisso first observed what is known as *Alternation of Generations* (q.v.)—i.e. that one or more asexual forms are interposed between the sexual. This alternation is sometimes very complicated.

The Tunicates, apart from Appendicularia, are conveniently divided into three groups—Simplicia, Composita, and Conserta—(1) simple forms, including the ordinary sea-squirts, and those which live socially, but without losing their independence; (2) compound forms, where numerous individuals are subordinated in a colony which may be either sedentary or free-swimming; and (3) free-swimming forms in which the sexual generations are united in chains. The first lot may be represented by the common Ascidia, Cynthia, &c., some of which are eaten; by Chevreulius, which has a test with two movable flaps; by the stalked form Boltenia; and by the social Clavellinas. The Botryllidæ are among the commonest types of sedentary compound forms, while the brightly phosphorescent cylindrical Pyrosoma is free-swimming. The members of the third group have a very complex structure, and exhibit alternation of generations. They are represented by Salpa and Doliolum. In Doliolum the sexual generation (A) gives rise to an asexual form (B); this develops two kinds of asexual buds (C and D), from one of which the sexual generation (A) is again produced. The development of the ascidians, first observed by Kovalevsky in 1866, has secured their position as vertebrates. Stage for stage it exhibits the closest resemblance to the development of amphioxus. The fertilised ovum divides completely and regularly to form a hollow ball of cells (*blastosphere*). One half of this ball is depressed within the other, and the result of this *invagination* is the two-layered oval embryo known as a Gastrula. Along the dorsal side of this embryo an axial groove appears—the medullary groove, which becomes converted into a closed canal by the meeting of its two folds. Thus is formed the neural canal of the spinal cord. In the closure a communication is for a time left between the cavity of the canal and the original mouth of the gastrula. This communication, connecting nerve canal and primitive gut, is known as the neurenteric canal. On the back of the primitive gut, towards the posterior end, a band of cells is formed, the beginning of the notochord, which supports the growing tail, and represents in these lowly vertebrates the incipient 'backbone.' The sides of the primitive gut-cavity form posteriorly the lateral muscles. All this time the embryo has been inclosed within its egg-membrane, but with the growth of the tail, two or three days after fertilisation, the imprisoning case is burst, and there is liberated a free-swimming larva—strikingly like a tadpole. At the end of the closed canal, which may be said roughly to represent the spinal cord, there is a dilatation which may be called the brain. In this some progress soon becomes manifest, especially in the appearance of ear and eye, which remain in closest association with the brain, and are lost in the degenerate adult. The remains of the primitive gut form in various ways the respiratory pharynx, the œsophagus, stomach, and intestine of the adult ascidian.

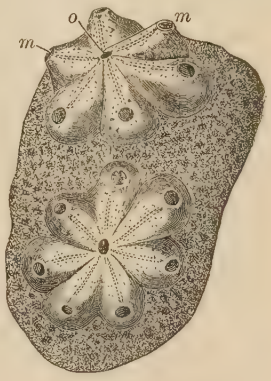


Fig. 2.—Compound Ascidian (after Milne-Edwards): Rosettes of 6 or 7 united individuals, with separate inhalent, but united exhalent apertures; *m*, the inhalent aperture; *o*, the common exhalent aperture. The colonies are attached to a piece of seaweed.

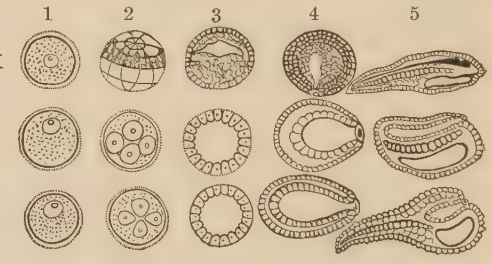


Fig. 3.
Development of: I, Ascidian; J, Amphioxus; K, Frog. 1, ovum; 2, segmenting ovum; 3, morula or blastosphere; 4, gastrula; 5, further advanced embryo.

About the time the larva is hatched, another very

important organ appears. A pair of outgrowths from the front of the gut meet, and fuse with a pair of dorsal involutions from the skin. The result is a paired atrial cavity, virtually open to the exterior by the two apertures of involution, and connected with the gut at the origin of the outgrowths—i.e. by gill-clefts. After a while a second pair of clefts appear, opening into the same atrial cavity. It must be noted at this stage that a secretion from the skin which began before the larva was hatched, has resulted in the formation of an intact 'test,' which clothes the entire larva, and is nowhere perforated. The free tadpole-like larva now fixes itself, first by a papilla and then by its test, as shown in the diagram, and with attachment the spinal cord, notochord, &c. begin to degenerate. An opening in the test appears opposite the mouth,

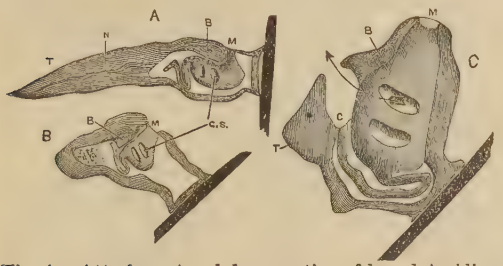


Fig. 4.—Attachment and degeneration of larval Ascidian (from Lankester):

A, Immediately after attachment to stone or shell; B, showing the degeneration of tail, spinal cord, &c.; C, a young Ascidian which exhibits the symmetry and essential structure of the adult.

b, brain; *m*, mouth; *n*, notochord; *g.s.*, gill-slits; *t*, tail.

which thus becomes at length functional. The paired atrial cavities also open by perforations through the test, and dilate internally so as to embrace the whole of the respiratory pharynx. To this their walls become, indeed, attached, and a large number of gill-slits perforate this double wall. The two openings to the exterior coalesce into one, and the two cavities also unite to form a single peribranchial chamber. The anus has been gradually shunted dorsalwards, and opens into the atrial cavity in the region already referred to as the cloaca. The gradual modification of structure is well illustrated in the accompanying figure. The result illustrates that degeneration which not infrequently follows from sedentary life.

See AMPHIOXUS, APPENDICULARIA, DEGENERATION, VERTEBRATA; also Huxley's *Anatomy of Invertebrates;* Balfour's *Embryology;* Ray Lankester's *Degeneration* and *Treatise on Zoology;* Herdman in *Camb. Nat. Hist.*, and '*Challenger*' *Reports;* Alder's *British Tunicata* (1905).

Asclepiadaceæ (or *Asclepiadeæ*), a chiefly tropical family of sympetalous dicotyledons, closely allied to Apocynaceæ, from which they are chiefly distinguished by the united filaments and coherent stigmas to which the anthers adhere, as well as by the peculiar orchid-like pollen-masses. They are mostly shrubs, often with twining stems, and almost always possess milky juice, which is usually poisonous, sometimes so much so as to be used for arrow-points, but is occasionally bland, and even in the case of the Cow-plant of Ceylon (*Gymnema lactiferum*) is used as food. It is sometimes also a source of caoutchouc. Some are prized by florists, notably the fragrant Stephanotis, the Wax-plant (*Hoya carnosa*), as well as species of the curious genus Ceropegia, and the cactus-like and carrion-scented Stapelia. A number of species are medicinal, as Indian Sarsaparilla (*Hemidesmus indicus*); Mudar (*Calotropis gigantea*), highly prized in the East Indies; *Sarcostemma glaucum*, the Ipecacuanha of Venezuela; *Tylophora asthmatica* and *Secamone emetica*, the roots of which are used as emetics, and in smaller doses as cathartics, and the former of which is employed as Ipecacuanha in India. *Cynanchum acutum*, which yields a purgative called Montpelier Scammony, and *Vincetoxicum officinale*, which possesses similar properties. Argel, much used for adulterating senna, belongs to this family.—The down of the seeds is too brittle to be a good substitute for silk or cotton; but the stems of not a few species afford useful fibres, as those of the *Asclepias syriaca*, of the Mudar and other species of *Calotropis*, natives of India and Persia, of *Dregea volubilis*, of *Holostemma Rheedianum*, &c. The Mudar or Yercum fibre is highly spoken of, and the bark of *Marsdenia tenacissima*, a small climbing-plant, yields a fibre called *Jetee*, of which the Rajmahal mountaineers make bowstrings of remarkable elasticity. The fibre of *M. Roylei* is used in Nepal. *Orthanthera viminea*, which grows at the base of the Himalayas, and has long leafless wand-like stems of 10 feet in height, yields a fibre of remarkable length and tenacity, suited for rope-making. The fibres of other species are used in Sindh for making the ropes and bands used in wells, as water does not rot them. A few species, as *Marsdenia tinctoria*, a native of Silhet, yield a kind of indigo. There are many species of the family native in North America.

Asclepiades, a Greek physician, born at Prusa, in Bithynia, who flourished during the early part of the 1st century B.C. He seems to have wandered about as a not very successful teacher of rhetoric, before he finally settled at Rome, where, by the practice of medicine, he had risen in Cicero's time to considerable fame and wealth. He was opposed to the principles of Hippocrates. Pliny, who professes very little respect for him, reduces his medicinal remedies to five: abstinence from flesh, abstinence from wine under certain circumstances, friction, walking, and 'gestation' or carriage exercise, by which he proposed to open the pores, and let the corpuscles which caused disease escape in perspiration; for his leading doctrine was, that all disease rose from an inharmonious distribution of the small, formless corpuscles of which the body was composed. He also employed emetics and bleeding, but in general consulted the tastes and whims of his patients; his maxim being, that a physician ought to cure surely, swiftly, and agreeably. He is said to have been the first who distinguished between acute and chronic diseases, and the invention of laryngotomy is also ascribed to him; but his knowledge of anatomy was apparently very slight. Gumpert edited the fragments of his writings (Weimar, 1798).

Asclepias (or *Swallow-wort*) is the typical genus of Asclepiadaceæ (q.v.). The species are generally erect, seldom climbing and twining, herbaceous plants with opposite, whorled, or alternate leaves and flowers in umbels. They are mostly American.—*A. syriaca*, Virginian Swallow-wort, or Virginian Silk, is a native of North America, and not of Syria, as was supposed. It is frequently cultivated in flower-gardens. The young shoots are eaten in North America like asparagus, as those of *Sarcostemma stipitaceum* of the same family are in Arabia. A brown well-tasted sugar is prepared in Canada from the flowers; and the silk-like down of the seeds has been tried for the manufacture of textile fabrics, either alone, or along with wool or silk, but is more frequently employed for the preparation of wadding, and for stuffing mattresses and pillows. The plant appears, however, to be chiefly valuable for the fibre of its stalks, which has been used in a small way for the manufacture of thread and cloth in some

parts of North America. The fibre is said to be of very superior quality, and that of other species furnishes muslin and paper in India. The plant rapidly extends by its creeping root-stocks, and readily becomes a weed.—The roots of several other North American species are used as diaphoretics and expectorants, as *A. incarnata*, *A. tuberosa*, &c. The latter is a very ornamental garden-flower, and is called Butterfly Weed and Pleurisy Root in the United States, where it is frequent on stony and sandy grounds. *A. curassavica* is called Wild Ipecacuanha in the West Indies, and a decoction of it is used by the negroes as an emetic and purgative.—Some would have it that the Soma (q.v.) plant of the Vedas was an asclepias.

As'coli Píceno (anc. *Asculum Picenum*), a city of Italy on the Tronto, 83 miles S. of Ancona by rail. It has a fine cathedral (15th–16th centuries), the beautiful church of San Francesco, and some Roman remains, and manufactures of majolica and glass-ware, silk, leather, &c. It suffered much from an earthquake in 1878. Pop. (commune) 32,000. The province of Ascoli Piceno, in Central Italy, belonging to the Marches, has an area of 805 sq. m. and a pop. of (1921) 265,164.

Ascoli Satriano (anc. *Asculum Apulum* or *Satrianum*), an episcopal city, 19 miles S. of Foggia. Pop. 10,000. Pyrrhus here defeated the Romans, 279 B.C.

Ascoli, GRAZIADIO ISAIA, Italian philologist, was born of Jewish parentage at Görz in 1829, and was destined for a mercantile career, but early devoted himself to the study of comparative philology. His *Studii Orientali e Linguistici* procured him in 1861 a chair of philology at the Milan Academy, and besides founding the *Archivio Glottologico* (1873), he published *Fonologia Comparata* (1870), *Studii Critici* (1861–77), and *Lettere Glottologiche* (1886). He died in February 1907.

Ascot Heath, a race-course in Berkshire, 29 miles WSW. of London, and 6 SW. of Windsor. It is circular, only 66 yards short of 2 miles in length; the races, which take place in June, are generally attended by the royal family in semi-state. From the accounts of the Master of Horse for the year 1712, it would appear that they were instituted, not in 1727 as is commonly supposed, but by Queen Anne on August 6, 1711.

Asellio, GASPARO, a celebrated Italian physician, was born at Cremona about 1581, and died in 1626, having been professor of Anatomy and Surgery at Padua. In 1622, while at Milan, he discovered the lacteal vessels, which he seems, however, never to have understood or described with complete accuracy. He left a treatise, *De Lactibus* (1627).

Asellus, a generic name now disused, formerly applied to the cod and other Gadidæ. It is retained in the pharmacopœias, in the name of Cod-liver Oil, *Oleum jecoris aselli*.—The name also denotes a genus of small Isopod Crustaceans, one of which, *A. aquaticus*, the Water Hog-louse, is common in stagnant ponds in Britain. This genus is the type of a family, Asellidæ. See WOOD-LICE.

Aseptic Surgery. See ANTISEPTIC AND ASEPTIC SURGERY.

Ases, Asgard. See ÆSIR, SCANDINAVIAN MYTHOLOGY.

Asgill, JOHN, an eccentric writer, born at Hanley Castle, Worcestershire (1659), was called to the bar in 1692. Having got into difficulties, he sailed in 1699 for Ireland, where an act for the resumption of forfeited estates promised plenty of lawsuits. His talents gained him a lucrative practice; and in 1703 he even obtained a seat in the Irish parliament. Three years before, however, he had published a paradoxical pamphlet, bepraised by Coleridge, to prove that by the rules of English law, the redeemed need not die. Much to his own surprise, the public flew into a rage against this absurd production; the Irish parliament voted it a blasphemous libel, and the astonished author was expelled the House. In 1705 he returned to England, and entered the English parliament as member for Bramber, in Sussex. But the fame of his unlucky pamphlet haunted him perpetually; for the English House condemned it to be burned by the common hangman, and expelled Asgill in 1707. At last he found something like peace in the King's Bench and the Fleet, where, imprisoned for debt, he continued to practise professionally, and to indite innumerable pamphlets. He died in November 1738.

Ash (*Fraxinus*), a genus of trees belonging to the family Oleaceæ, and distinguished by very imperfect flowers, in which the calyx is obsolete, and the corolla either wanting or 3–4-partite; the fruit is a *samara*, a seed-vessel winged at the edges and extremity. The leaves are deciduous, and are pinnate with a terminal leaflet. There are about fifty species, limited to the non-tropical parts of the northern hemisphere. The only species indigenous in Britain, and throughout central and northern Europe, is the Common Ash (*F. excelsior*). It is a beautiful and umbrageous tree, highly ornamental in parks, but extremely injurious to the grass or crops immediately around it. It rises to the height of 70–100 feet, often with a fairly clean stem. The wood is white, tough, and hard, much valued by wheel-wrights, cart-wrights, coach-makers, implement-makers, &c. It ranks next in value to that of the oak for strength and durability, and is adapted to a much wider range of uses. It is also excellent for oars and for aeroplanes. When irregular in the disposition of its fibres, and finely veined, it is prized by cabinet-makers. The wood of the young trees is almost as valuable as that of the old. Indeed, the value of the timber is greatest in trees of which the growth has been rapid, as it exhibits the characteristic toughness in the highest degree. The ash prefers a loamy soil, and grows best on a good fresh soil, where it is one of our most valuable hardwood timber-trees; and it is also one of our best coppice-trees. Among numerous garden varieties the most remarkable are the Weeping Ash, with boughs bent almost straight down to the ground; the Curl-leaved Ash, with dark-green wrinkled or curled leaves; and the Entire-leaved Ash, a very curious variety, with many or all of the leaves simple (not pinnated), which has been erroneously regarded by some botanists as a distinct species, and named *F. simplicifolia*, *F. heterophylla*, &c.—The Small-leaved Ash, otherwise called the Lentisk Ash (*F. parvifolia*), is a native of the shores of the Mediterranean, and is a very graceful and ornamental tree.—The American Ash, or White Ash (*F. americana*), is readily distinguished from the Common Ash by its lighter bark and paler green leaves. It is abundant in New Brunswick, but becomes rare to the south of New Jersey. It is the best ash for growing on dry soil, and produces a very tough and elastic wood prized for oars.—The Red Ash (*F. pennsylvanica*) is very similar, but of smaller size, and has a deep brown bark. It is most abundant in Pennsylvania, Maryland, and Virginia, especially in swampy ground.—The Black Ash of the New England States, New Brunswick, &c. (*F. nigra*), is a large tree with buds of a deep blue colour.—The Blue Ash of Ohio, Kentucky, Tennessee, &c. (*F. quadrangulata*), is also a large tree. The branches are quadrangular, the young shoots having on the angles four membranes

which extend their whole length.—The Green Ash (*F. americana*, var. *juglandifolia*), characterised by its brilliant green young shoots, is chiefly found in the middle States; and the Water, Swamp, or Carolina Ash (*F. caroliniana*), remarkable for the great size of its leaflets, chiefly in the southern

Branch of Common Ash (*Fraxinus excelsior*): *a*, fruit.

States. Besides these, North America produces a considerable number of other species or varieties. The wood of all of them is used for somewhat similar purposes to that of the Common Ash, but none of them have proved of value as forest trees in this country. Asia has a score or so of species. The Common Ash suffers much from late frosts, rabbits, and fungus canker.

The Manna Ash, or Flowering Ash (*Fraxinus Ornus*), formerly, on account of some structural distinctions in its flowers, placed in a different genus as *Ornus europæa*, strongly resembles the Common Ash in foliage, but is smaller, and cannot be considered a timber tree of any importance. It is a native of the south of Europe, and is very abundant in Sicily, whence the finest manna is obtained. An allied species (*F. rotundifolia*), a native of Greece, also produces manna in quantity, but not equal in quality to that of the other species. Manna is the concrete juice of these two trees, and is obtained by means of transverse incisions in the bark, but it often also exudes spontaneously during the heat of summer.

The ash has a peculiar importance in Scandinavian mythology. The first man and woman formed were Ask and Embla (Ash and some other tree—some equate the word with the Greek *ampelos*, 'vine'). The court of the gods is represented in the Edda as held under an ash, called Yggdrasil (q.v.). The ash was in many countries, and from ancient times, believed to be a powerful defence against witches, fairies, poisonous animals, and some diseases. In the Highlands of Scotland, ash sap was administered to infants as their first food; elsewhere, herd-boys preferred an ash rod as a herding stick; in Cornwall a single blow from an ash wand was death to an adder. Gilbert White tells that in Selborne ruptured children used to be passed naked between the sides of a cleft ash tree in order to be healed. It was held dangerous to break a bough from the ash.

Among other trees bearing the name of Ash in one form or other, the Mountain Ash, or Rowan Tree (q.v.), so called on account of the resemblance of its foliage to that of the Common Ash, belongs to the Rosaceæ. It had also magical powers. The Poison Ash (*Rhus venenata*) is a gum or varnish bearing tree or shrub of North America, and belongs to the Anacardiaceæ.—The Bitter Ash (*Simaruba amara*) of the Simarubaceæ yields the powerful tonic drug known as *Simaruba Bark*. The tree is a native of the West Indies.—The Cape Ash (*Ekebergia capensis*) is a valuable timber tree of the Cape of Good Hope; among the timber trees of the Cape it occupies a similar position to the Common Ash in this country, but is in no way related to the latter; it is of the Meliaceæ.—Prickly Ash or Toothache Tree (*Zanthoxylum americanum*), one of the Rutaceæ, is a native of the United States. The bark, the leaves, and seed vessels abound in volatile, aromatic, oily and resinous constituents, and a peculiar principle named Xanthoxylin, which are used in the United States for the cure of toothache and chronic rheumatism.

Ashango, a tribe of Western Equatorial Africa, inhabiting a thickly-wooded plateau (1000 to 1500 feet) south of the Ogowé, 230 miles from the Atlantic coast. They are great slave-holders, are very superstitious, and are broken up into several sub-tribes. Among these are the Obongo, a race of hairy, yellow-skinned dwarfs, whose average height does not exceed 4 feet 4 inches. They live well within the limits of French Congo.

Ashanti, or ASHANTEE, part of British West Africa, lying inland (6°–9° N., 0°–3° W.) between the Gold Coast Colony proper and its Northern Territories; area, over 20,000 sq. m; pop. 400,000. It is hilly, densely forested, and well watered, but none too healthy, especially in the lower alluvial districts. The land in the neighbourhood of the towns is carefully cultivated, and is extremely fertile, producing maize, millet, rice, yams, tobacco, sugar, cocoa, the pine-apple, and other fine fruits, with gums, rubber, and timber. The principal exports are gold and gold-dust, palm-oil, india-rubber, cocoa, kola. The natives, mostly strong and well developed physically, speak a language (or languages) belonging to the Tshi group. They show much skill in certain articles of manufacture. Polygamy is universal. Fetish worship, ancestor worship, and animism constitute the religion; human sacrifices were formerly in vogue. The capital is Kumasi (q.v.), with railway to Sekondi.

The traditions of the Ashanti state point to an emigration some hundreds of years ago from the north, probably caused by the spread of the Mohammedan empire of Timbuktu. In 1700 Kumasi was made the capital by Osai Tutu, who conquered Akim, Assin, Gaman, Denkira, and other neighbouring states, and became a sort of feudal sovereign over a large district. In their course of conquest over the Fantis, the Ashantis became involved in war with the British (1807–26), and were finally driven from the sea-coast. In 1873–74, in consequence of disputes arising in connection with the cession of the Dutch forts to Britain, they were again involved in a war with the same power; and an army under Sir Garnet Wolseley forced its way to the centre of the kingdom. After a severe battle at Amoaful, Kumasi was taken (4th February 1874) and burned. Internal disorder necessitated another expedition in 1895–96, which led to the submission and exile of King Prempeh. No successor was appointed; Ashanti became a British protectorate, and a British Resident was installed at Kumasi. In 1900 a rebellion broke out, and Sir F. Hodgson, governor of the Gold Coast, and his wife were in April besieged with a small force in Kumasi fort, but in July succeeded in cutting their way to the

coast. An expedition under Colonel Willcocks relieved Kumasi (July 15), gallantly held by a few defenders. The campaign ended in the annexation of Ashanti in 1901. It is under the governor of the Gold Coast, but has different laws. Prempeh returned, a private patron, in 1924, and was made paramount chief of Kumasi (not of Ashanti) in 1926.

See GOLD COAST; works by Bowdich (1819, new ed. 1873), Brackenbury (1874), Stanley (1874), Col. Ellis (1893), R. A. Freeman (1898), Lady Hodgson (1901), Fuller (1921), and Capt. R. S. Rattray (1923, 1927); and history by W. W. Claridge (1915).

Ashbourne, a pleasant market-town of Derbyshire, 13 miles NW. of Derby. Its church (1241) has a fine spire, the 'Pride of the Peak,' 212 feet high, and an exquisite monument by Banks. There are also a grammar-school (1585) and a market-hall (1861). Prince Charles Edward was here in 1745, and here Moore wrote great part of *Lalla Rookh*. Pop. (urban district) 4000.

Ashburton, a small town in south Devonshire, on the borders of Dartmoor, 9½ miles NNW. of Totnes by rail. Till 1868 it returned a member to parliament. Pop. of urban district, 2400.

Ashburton, ALEXANDER BARING, LORD, born in 1774, second son of Sir Francis Baring (q.v.), was for several years engaged in the United States, in the service of the great London mercantile house established by his father. On the death of the latter in 1810, he became the head of Baring Brothers & Co., having four years before been elected member for Taunton. He represented that place, Callington, and Thetford in the Liberal interest till 1832, and in 1833 was returned for North Essex as a moderate Conservative. In Peel's brief administration (1834–35) he was President of the Board of Trade, and was created Baron Ashburton in 1835. In 1842 his knowledge of business, and thorough acquaintance with American institutions, caused him to be appointed special ambassador to the United States to settle the north-east boundary question, and other disputes, which then threatened to involve the two countries in war. In August of that year he concluded the famous treaty of Washington, commonly called the Ashburton Treaty, by which the frontier line between the state of Maine and Canada was definitely agreed to. Seven-twelfths of the disputed territory, and the British settlement of Madawaska, were given by it to the United States; but it secured a better military frontier to Britain, and included heights commanding the St Lawrence, which the award of the king of Holland had assigned to the Americans. Provisions were also made for putting an end to the African slave-trade, and for the mutual extradition of criminals. Lord Ashburton opposed free-trade, but strongly supported the penny-postage system when first proposed by Rowland Hill in 1837. He died 13th May 1848.—His son, WILLIAM BINGHAM BARING, second Lord Ashburton (1799–1864), held two or three offices, but is chiefly remembered through his first wife, who made their house a meeting-place of politicians and men of letters, among the latter Thackeray and Carlyle.

Ashburton River, an unnavigable stream of Western Australia, rising in the mountains west of the Great Desert, and flowing 400 miles northwestward into Exmouth Gulf. Its lower course was explored by Sholl in 1866, its upper by Giles in 1876.

Ashby-de-la-Zouch, a town of Leicestershire, near the source of the Mease, a tributary of the Trent, 18 miles NW. of Leicester. It owes its suffix to the Norman family of La Zouch. Their ruined castle, celebrated in Scott's *Ivanhoe*, and rebuilt in 1480 by Sir William Hastings, crowns a height to the south of the town. Mary, Queen of Scots, was imprisoned here. In the church are the tombs of the Hastings or Huntingdon family. Soap, hosiery, and lace are made. Pop. 5000.

Ashdod, the New Testament AZOTUS (now *Esdud*), a village on the Mediterranean, 21 miles S. of Jaffa. It was formerly one of the chief cities of the Philistines, strongly fortified, and the scene of numerous contests between that race and the Jews. Into this city the ark of the covenant was brought by the Philistines, and placed in the temple of their god Dagon. About 715 B.C. the town was taken by Tartan, general of the Assyrians; and in the following century it was captured by the Egyptians, under Psammetichus, after a twenty-nine years' blockade and siege. It was destroyed by the Maccabees, and though afterwards rebuilt by the Romans, never regained its early importance. Esdud is now a miserable village with a population of about 300.

Ashdown, the seat of Lord Craven, in West Berkshire, 3¼ miles NW. of Lambourn. Here, in 871, Ethelred and Alfred gained the great victory of Æscdun over the Danes.

Ashe'ra, the name of a Phœnician goddess, or rather of the idol itself by which the goddess was symbolised. The name is frequently mentioned in the Old Testament in connection with Ashtoreth and her worship, and it appears certain that the latter is the proper name of the goddess, while Ashera is her image or symbol. The image was always of wood, and is probably a survival of tree-worship. The view is now generally given up that it points to the phallic emblem and the licentious rites associated with the worship of Ashtoreth. The translators of the Authorised Version, following the renderings of the Septuagint and the Vulgate, translated the word by 'grove,' spite of the difficulties offered by such passages as 2 Kings xxi. 7 and xxiii. 6; but this error has disappeared in the Revised Version. See ASTARTE.

Ashes, the remains of animal and vegetable bodies after burning. It is not strictly correct to speak of the ashes of a mineral. When lead, for instance, is exposed to heat, it turns to dross, which has the appearance of ashes, but is merely the lead combined with oxygen. In the same way, volcanic ashes, as they are called, are only a finer kind of pumice-stone, the solidified scum of molten lava. The ashes of organic substances destroyed by fire consist of the fixed salts contained in these substances. In land-plants, the most important are salts of potash, along with silica and lime; in sea-plants, soda takes the place of potash. By lixiviation of the ashes, the potash or soda is dissolved and separated from the insoluble mass, and is then purified by crystallisation. The ashes of sea-plants contain also more or less iodine. Peat and turf ashes contain, besides alkalies, more or less clay and sand; the same is true of pit-coal, which sometimes contains iron.

At one time the ashes or inorganic ingredients of plants were considered unessential to their existence. But the progress of vegetable chemistry has taught that a certain proportion of saline food is absolutely necessary to the development of plants. The analysis of the ashes of the different kinds of vegetable substances has since become of great interest.

The ashes of animal bodies do not differ greatly from those of vegetables. Bone-ashes consist essentially of lime united with phosphoric acid. This bone-earth is very valuable as manure for grain. In well-wooded countries, ashes from burnt wood form an article of considerable trade. They are much used in the processes of soap-boiling, bleaching, dyeing, glass-making, &c. Wood-ashes

are also used in washing and other domestic processes as a cheap preparation of potash (see POTASSIUM), better known under the names American ashes or pearl-ash. For volcanic ash, see VOLCANOES.

Asheville, a city of North Carolina, finely situated in the Blue Ridge Mountains, 210 miles W. of Raleigh, with machine shops, furniture and tobacco factories, cotton and flour mills. It is the centre of an agricultural and hardwood district, and mica and clay are worked. It is a popular winter and summer resort. Pop. (1920) 28,504.

Ashford, an urban district of Kent, 14 miles SW. of Canterbury. It is an important junction, with large railway works. The parish church has a fine Perpendicular tower. Pop. 14,400.

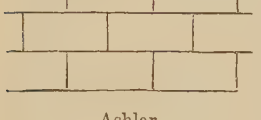
Ashiesteel, ASHIESTIEL or ASHESTIEL, a house on the Tweed at the influx of the Peel Burn, in Selkirkshire, 4 miles WSW. of Galashiels, was leased by Scott, 1804–12.

Ashingdon, a parish of South Essex, 2¼ miles N. of Rochford. Here, in the battle of Assandun (1016), the sixth fought in the year, Canute defeated Edmund Ironside.

Ashkenaz, the name of a northern people mentioned in the table of races given in Gen. x., located in Armenia or its neighbourhood. The later Jews identified it with Germany. At the present day, the Polish and German Jews are termed *Ashkenazim*, as opposed to the *Sephardim*, the Spanish and Portuguese Jews. They have different synagogues, in which a somewhat different ritual and a different pronunciation of Hebrew are used, though there is no doctrinal distinction, nor now any disinclination to social intercourse and intermarriage.

Ashland, a borough of Schuylkill county, Pennsylvania, 84 miles NW. of Philadelphia, with anthracite collieries and machine-shops; pop. 7000. (2) A city of Wisconsin, on Lake Superior, 280 miles NW. of Milwaukee, with factories and machine-shops; pop. 11,000. (3) A city of Ohio, 40 miles WSW. of Akron; pop. 12,000.

Ashlar, or ASHLER, building-stone squared and hewn, as distinguished from rubble or rough stones which are used as they come from the quarry without being dressed. Ashlar is laid in regular courses in building, and is of various kinds, according to the style of working that side of the stone which is to form the facing of the wall. Thus there are *tooled* ashlar—the marks of the tooling being either *random* or in *grooves; polished* ashlar, in which the face of the stone is rubbed smooth; and *rustic* ashlar, in which only the joints are accurately hewn, the face of the stone being left projecting irregularly. Quarriers apply the term ashlar to squared stones before being hewn. The word is derived through the old Fr. *aiseler*, from Lat. *axillaris*, which is from *axilla*, a diminutive of *axis*, 'axle,' 'plank.' In old documents, the term appears under a variety of forms, such as achlere, ashelar, aslure, and estlar.



Ashlar.

Ashley, LORD. See SHAFTESBURY.

Ashmole, ELIAS, antiquary, was born at Lichfield, 23d May 1617, and commencing the study of law when only sixteen, in 1638 became a solicitor. During the Great Rebellion he embraced the Royalist cause, and was appointed a captain of horse and comptroller of the Ordnance; but at the same time exhibited his love of study by entering Brazenose College, Oxford, where he sedulously applied himself to mathematics, natural philosophy, astronomy, astrology, and alchemy. In 1646 he became acquainted with Lilly and other famous astrologers; and in 1650 he edited a work of Dr Dee's, to which he subjoined a treatise of his own. In 1652 he issued his *Theatrum Chymicum*, and in 1672 his *magnum opus*, a *History of the Order of the Garter*. At the Restoration, various honours and emoluments were conferred upon him; and thenceforward he mainly devoted himself to heraldic and antiquarian studies. In 1682 he presented to the university of Oxford a fine collection of rarities, bequeathed him by his old friend Tradescant, and known as the Ashmolean Museum. He died 18th May 1692. Among his friends were Selden and Dugdale, whose daughter became his third wife. See his quaint Diary (1717; ed. Gunther, 1927).

Ashmun, JEHUDI, an American philanthropist, was born at Champlain, New York, in 1794. He was educated for the ministry, but eventually became editor of a magazine in which he advocated the views of the African Colonisation Society for founding a colony of liberated negroes on the west coast of Africa. For this association he conducted a body of liberated negroes from Baltimore, landed at Cape Mesurado, the seat of the infant colony of Liberia, in the autumn of 1822, and assumed the superintendence of affairs. Here, for more than six years, he devoted himself to establishing this colony. His health failing, he returned to America, and died at New Haven, Connecticut, 25th August 1828. See his Life by R. R. Gurley (1835), and LIBERIA.

Ashraf, a town in the Persian province of Mazanderan, near the south coast of the Caspian Sea, 56 miles W. of Astrabad. It was a favourite residence of Shah Abbas the Great, and was adorned by him with splendid buildings, of which only a few miserable ruins now remain. It still has some trade in the cotton and silk produced in its vicinity.

Ashtabula, an important railroad city and lake-port of Ohio, 58 miles ENE. of Cleveland. It is one of the leading ports on Lake Erie, with enormous shipments of iron and coal. It has shipyards, tanneries, factories, &c. Pop. 22,000.

Ash'taroth, Ashtoreth. See ASTARTE.

Ashton-in-Makerfield, an urban district in south Lancashire, 4 miles S. of Wigan. Pop. 22,500, chiefly engaged in collieries and in the hardware manufacture.

Ashton-under-Lyne, a town of south-east Lancashire, 6½ miles E. of Manchester. It was enfranchised in 1832, and returns one member to parliament. A great seat of the cotton manufacture, it suffered severely during the cotton famine (1861–65). The population is also employed in bleaching, dyeing, silk-weaving, in collieries, and in the manufacture of machines, bricks, &c. Among the buildings are the town-hall (1841), the infirmary (1860), and the old parish church, with some 15th-century stained glass. Francis Thompson was a native. Pop. (parl. borough, including Hurst) 51,500; (munic.) 43,000.

Ashur. See ASSUR, ASSYRIA.

Ash-Wednesday, the first day of Lent (q.v.), so called from the Catholic ceremony of strewing ashes on the head as a sign of penitence. This custom, probably introduced by Gregory the Great (590–604), was sanctioned by Pope Celestin III. in 1191, and afterwards generally prevailed. Before mass, the ashes are consecrated on the altar, sprinkled with holy water, and signed three times

with the cross, while the priest recites the words, *Memento quod cinis es, et in cinerem reverteris* ('Remember that thou art dust, and into dust thou shalt return'). Next they are strewed on the heads of the officiating priests, the clergy, and the assembled people. The ashes are those of the palms consecrated on the preceding Palm Sunday (q.v.).—The Protestant Church in Germany does not celebrate Ash-Wednesday. In the Church of England it is observed, but without anything of the ceremony from which it derives its name; and the *Commination* (q.v.) is appointed to be read in the service for this day.

Asia, the largest of the divisions of the world, occupies the northern portion of the eastern hemisphere in the form of a massive continent which extends beyond the Arctic circle, and by its southern peninsulas nearly reaches the equator. The philological origin of the name, while not quite certain, is probably in an Oriental root meaning 'dawn,' so that the area would be named from the *west*. Certainly the first elements of our geographical terminology originated in Greece, and Asia was a local name given to the plains of Ephesus. This name was apparently extended to the Anatolian peninsula, and later on to the whole of the continent.

Viewed in their broad features, Europe and Asia constitute but one continent, often now called EURASIA, and having the shape of an immense triangle, the angles of which are Spain in the west, the peninsula of the Tchuktchis in the north-east, and that of Malacca in the south-east. The Arctic Ocean in the north, the Pacific in the east, and the Indian Ocean, continued by its narrow gulf, the Red Sea, which nearly reaches the Mediterranean, enclose the continent of Asia. This immense mass of land touches the latitude of 77° 34′ N. in Cape Tchelyuskin, while Cape Burros, at the extremity of the peninsula of Malacca, and 5350 miles distant from the former, falls short by 1° 15′ of reaching the equator. Cape Baba, in Asia Minor, advances as far west as the 26th degree of longitude, and the utmost NE. extremity of Asia—East Cape, 5990 miles distant from Cape Baba—protrudes to the 190th degree (12 hours 40 minutes) to the east of Greenwich. The area covered by Asia and its islands is about 17,600,000 sq. m.; that is, almost one-third of the land-surface of the globe (32 per cent.). It is a seventh larger than the surface of both Americas together, by one-half larger than that of Africa, and more than four times larger than that of Europe.

Boundaries.—Neither by its geographical features nor by its climate, vegetation, and animals, still less by the ethnographical features of its inhabitants and their history, can Asia be sharply separated from Europe. The physical features of both continents show a manifold interdependence; and however pronounced the individuality of Europe in the west, it melts into Asia in its eastern parts; while throughout its history Europe has been influenced by Asia in a thousand ways. Our races have been mixed with those of Asia; in Asia much of our civilisation, our religions, our political and social institutions had their origin; and ever since Europe made an independent start in history, it has never ceased to feel the influence of Asia. Geographically speaking, Europe is a mere appendix to Asia, and no exact geographical delimitation of the two continents is possible. The low Urals are not even an administrative frontier: European Russia extends over their eastern slope. Farther south, the dry steppes of Asia penetrate into Europe and pass indistinguishably into the prairies of Russia. Caucasus is surely Asiatic in character; but, to separate it from Europe, one must resort to the old dried-up channel of the two Manytch rivers, which at a geologically recent epoch connected the Black Sea with the Caspian. As to Asia Minor—also purely Asiatic in structure and inhabitants—it so closely approaches Europe that the Sea of Marmora and its narrow river-like straits seem almost an artificial boundary, while the islands surrounding Asia Minor mingle with those which continue Greece to the east, and the Anatolian plateau seems to be continued in the Balkan Peninsula.

The line of separation from Africa is better defined by the narrow Red Sea. But Arabia participates so largely in the physical features of Africa that it is in a sense intermediate between the two continents.

In the south-east, the numberless islands of the Dutch Indies—relics of a sunken continent—appear as a bridge towards Australia. The zoological boundary between the two areas, 'Wallace's Line,' runs between Bali and Lombok and up the Macassar Strait; but the physical boundary, as marked by the line of maximum depth of sea, runs east of Timor and up the Molucca Strait.

In the extreme north-east, Asia sends out a peninsula to meet one of the Alaskan peninsulas in America, from which it is separated only by a shallow and narrow channel, Behring Strait. Plants, animals, and men freely migrated over this ferry; while the geographer sees in the two peninsulas a line of connection between the two great plateaus of the Old and New World.

Peninsulas.—Although the coasts of Asia are much more indented by gulfs and peninsulas than those of Africa or America, still it stands in this respect much behind Europe, and has 1 mile of coast-line for every 337 sq. m. of its area, that is, three times less than Europe; besides, about one-fifth of its shores is washed by the ice-bound Arctic Ocean (9900 miles out of 51,000), or by the foggy and icy sea of Okhotsk, where navigation is possible only for a few months, or even weeks, in each year. Its peninsulas comprise nearly one-fifth of its surface (19 per cent., as against 28 in Europe), but they partake of the massive structure of the continent: they are massive too, and, as a rule, little indented. Three immense offsets continue the continent of Asia into more tropical latitudes—Arabia, India, and the Indo-Chinese Peninsula—and some likeness exists between them and the three southern peninsulas of Europe—Spain, Italy, and the Balkan Peninsula, surrounded by its archipelago of hundreds of islands. Asia Minor protrudes between the Black Sea and the Mediterranean as a huge mass of tableland broken by narrow gulfs in its western parts. In the Pacific there are only three large peninsulas—Korea, Kamchatka, and that of the Tchuktchis—the whole of the Pacific coast having the shape of wide curves turning their convexity to the sea, and indented by but a few gulfs. The flat, ever frozen, uninhabitable peninsulas of the Arctic Ocean, Taimyr and Yalmal, could play no part in the growth of civilisation.

Seas, Coasts.—The early inhabitants of Asia had no Mediterranean Sea to serve as a highway of communication between the southern peninsulas. The open gulfs which separate them—the Arabian Sea and the Bay of Bengal—are wide, open divisions of the Indian Ocean. The narrow, elongated Red Sea penetrates between the dry, stony, and barren lands of Africa and Arabia; and only now, since it has been brought into communication with the Mediterranean by the Suez Canal, has it become an important channel of traffic. The Persian Gulf, inclosed between the deserts of Arabia and the mountains of Persia, is bordered by regions scarcely

inhabited. Asia's true Mediterranean is on the east, where several archipelagoes, like so many chains of islands, mark off from the ocean the Southern and Eastern China Seas, whose Gulfs of Siam and Tonkin, and especially the Yellow Sea with the Gulf of Pechili, penetrate into the continent. Those gulfs, since the dawn of history, have promoted the development of marine traffic in these regions, and would have done so still more but for the dreadful typhoons, the constant danger of these seas. The Sea of Japan is less favoured by climate and currents; it is noted for the narrowness of its continental shelf and for the shallowness of its approaches, the Straits of Korea, Tsugaru, and La Pérouse all being under 100 fathoms in depth. The Sea of Okhotsk and that of Behring, although possessing fine gulfs (Ghizhiga, Anadyr), have no importance for the maritime traffic of nations. Still less the Arctic Ocean, with its wide estuaries and bays, and the Kara Sea, through which ships find a passage amidst the broken ice-crust for only a few weeks in the year.

Islands.—The islands of Asia are very numerous, and cover an aggregate of no less than 1,023,000 sq. m. (nearly 6 per cent. of Asia's surface). The coasts of Asia Minor are dotted with islands, of which the Sporades connect it with Greece. Cyprus was, from remote antiquity, a centre of civilisation; so also Ceylon. The Laccadives and Maldives are mere coral atolls, rising amidst the Indian Ocean, and sheltering some 40,000 inhabitants. The islands of East Asia are much more important. A narrow strip of islands, some large like Sumatra (177,000 sq. m.) and Java, others mere reefs, extend in a wide semicircle, under the name of Andaman and Sunda Islands, from Burma to Australia, separating the Indian Ocean from the shallow Java Sea and the Malay Archipelago. This last—an immense volcanic region inhabited by the Malay race—comprises the huge Borneo, the ramified Celebes, and the numberless small islands of the Moluccas, the Philippines, &c., connected on the north-west with China by the island of Taiwan (Formosa). This latter, as well as Hainan, may be properly considered as part of the Chinese mainland. The Loo-choo (Liu-kiu) Islands and the Japanese Archipelago, the latter joining Kamchatka by the Kuriles, continue farther NE. this chain of islands which border the coasts of Asia. Sakhalin is so closely situated to the continent that it was long regarded as a peninsula. In the Arctic Ocean, Wrangel Land, the small Bear Islands, the Liakhof Archipelago, the islands of the Kara Sea, and Nicholas II. Land, discovered in 1913, north of Cape Chelyuskin, are wrapped in ice-fields, but—by wireless report of ice conditions—the sea route to the Ob and Yenisei (from Tromsö) is practically assured (August 15–September 25).

Orography.—Asia is at once the largest and the highest of all continents. Not only has it a number of mountains which exceed by five and six thousand feet the loftiest summits of the Andes; it has also the highest and the most extensive plateaus. If the whole mass of its mountains and plateaus were uniformly spread over its surface, the continent would rise no less than 2885 feet above the sea, while Africa and North America would respectively reach only 2165 and 1950 feet.

High plateaus are the predominant feature of Asia's orographical structure; they occupy nearly two-fifths of its area. One of them—that of Western Asia, including Anatolia, Armenia, and Iran—extends in a south-easterly direction from the Black Sea to the valley of the Indus; while the other—the high plateau of Eastern Asia, still loftier and much more extensive—stretches NE. from the Himalayas to the north-eastern extremity of Asia, resembling in shape a South America pointing NE., and meeting at Behring Strait the north-western extremity of the high plateau of North America. These vast regions, mostly unfit for agriculture and human settlement, poorly watered over wide areas, and assuming there the character of dry deserts, divide Asia into two parts—the lowlands of Siberia and the Aral-Caspian depression to the north of the plateau-backbone, and the lowlands of Mesopotamia, India, and China to the south. These could enter into only occasional communication across the thinly peopled plateaus, and they have followed quite independent lines of development. The southern lowlands are themselves separated into three distinct parts, which have developed independently, without enjoying that continuous mutual intercourse which constitutes the distinctive feature of European civilisation.

(1) *Plateau of Eastern Asia.*—The high plateau of Eastern Asia, which stretches for 4500 miles to the NE. from the Himalayas, occupies more than one-fifth of the superficies of Asia. Its surface is by no means flat, as the rather inappropriate orographical name of 'plateau' might suggest. It has its depressions; it has also on its north-western borders several broad trenches which are cut in its mass, like gigantic railway-trenches leading with an imperceptible gradient from the lowlands to the heights of the plateau. For many consecutive geological periods these trenches were either channels for the drainage of the waters discharged by the plateau, or else gulfs of the seas which surrounded it, so that now their banks, water and glacier worn, appear like chains of mountains to the traveller who follows their flat bottoms. The plateau has also mountain-ridges rising several thousand feet above its surface, and high border-ridges. Its depressions do not usually sink to the level of the lowlands, which in Asia are practically defined by the 3000-foot contour; while the chains of mountains, although rising to high absolute altitudes, are still relatively low, their bases on the plateau being at a level of several thousand feet above the sea. They do not display the diversified aspect usually characteristic of alpine regions intersected by deep fertile valleys; and unvaried monotony—monotony of orographical features, climate, flora, and fauna—remains the distinctive feature of the plateau over immense distances. For thousands of miles the traveller finds the same broad and open valleys, the same harsh climate, the same species of plants and animals, the same unfitness for agriculture.

The highest parts of the East Asian plateau are in Tibet, where it has a width of 1600 miles from west to east, and an average height of from 10,000 to 17,000 feet (sometimes said to be equal to that of the summit of Mont Blanc; see TIBET), and only yak-breeding is possible in these high, cold, dry valleys. The highest plateau of the earth is girdled by the highest chain of mountains, the Himalayas—a typical 'border-ridge' which has one foot on the high plateau, and the other in valleys ten to fifteen thousand feet deeper, where the palm and vine grow freely. This immense chain of snow-clad peaks, which in Europe would reach from Gibraltar to Greece, raises its average summit above 20,000 feet; its lowest passes are 15,000 feet high, and Mount Everest—the highest mountain of the globe—has its snow-capped top at a height of 29,000 feet, that is 5½ miles above the sea. A series of chains separated from the Himalayas by high longitudinal valleys run parallel to them in the north, and of these, the Karakorum Mountains rise high above the snow-line; their loftiest peak, the Dapsang, is 28,700 feet high. In the east, the plateau of Tibet is bordered by the snow-clad mountains through which the great rivers of China, Burma, and

Siam find their way to the lowlands. They are still very little known.

In the north-west, the Tibet plateau joins another much smaller, but very high plateau—that of Pamir ('the roof of the world'), which covers an area of 37,000 sq. m. Several chains of mountains running NE. diversify its surface, but still the travellers crossing it need not descend to a level lower than from 10,000 to 11,000 feet until they have crossed its northern border-ridge, the Alai Mountains, whose peak Kaufmann (22,500 feet) exceeds twice the highest summit of the Pyrenees. The Muztaghata peak, in Eastern Pamir, reaches a height of 25,600 feet. Farther north and north-east of the Pamir, a wide, intricate complex of several high chains, running mostly from WSW. to ENE., with several ridges shooting from them to the NW., covers an aggregate area nearly as large as Germany. These mountains are known under the general name of Tian-shan (q.v.). The great Khan-tengri rises there to 24,000 feet, and most of the Tian-shan ridges are snow-clad; even the outer ridges raise their summits to fifteen or sixteen thousand feet—that is, above the upper limits of tree vegetation, while some of their deep, fertile valleys have been transformed into veritable gardens and granaries by means of irrigation.

(2) *Central Asian Depression.*—In the north, the plateau of Tibet is bordered by a succession of lofty chains (Kuen-lun, Altyn-tagh, Nañ-shan), reaching more than 20,000 feet in their highest parts. These chains separate it from the great central depression which is occupied by Eastern Turkestan in the west, and by the Desert of Gobi in the east. This great depression—including the Han-hai, or 'dried-up sea,' of the basin of the Tarim—must be considered, however, only as a lower terrace of the great plateau of Eastern Asia. It has an altitude of from 4000 to 5000 feet in the west, but drops to 2600 in Lob-nor, and to −300 in the allied Turfan basin. It has no outlet to the sea—not even to Lake Aral or the Caspian; any winds which might bring the moisture of the ocean are deprived of it in crossing the higher plateaus and border-ridges which surround it, and so this floor of an immense interior sea is rapidly drying up. All through the historical period it has apparently continued to dry up,—till Lob-nor has become now but a series of shifting reed-choked swamps, which are migrating westwards under the influence of persistent easterly winds, accompanied by terrific sandstorms —a small remnant of a much larger sea which existed at the dawn of history, and in whose rapid desiccation we probably must look for one of the causes which impelled the Huns and the Mongols to their great migrations towards the west. Human settlements, secluded from the rest of the continent, and rarely visited now by a few caravans, are scattered only in the upper parts of the tributaries of the Tarim, where the water of few and scanty rivers may maintain life; but they were much more numerous before, as is testified by ruins of great cities, now buried under the drifting sands. In the Eastern Gobi, where the SE. monsoons of the Pacific during the summer, if not also the NW. winds from Siberia during the winter, bring some moisture, the gravelly soil is covered with grass for a few months each year; but in the west, man must sustain a hard struggle against the moving sands raised by storms in the air, more dreaded than the worst snow-storms of the far north. In the south-east, towards the chains of Ala-shan and In-shan, the wild horse and the wild camel—ancestors of our domesticated breeds—find their last refuge on lonely pastures scarcely ever visited by man.

(3) *Northern Part of the Great Plateau.*—The dry and barren ridge called Eastern Tian-shan, and two other ridges running NW., separate the Han-hai depression of Central Asia from the trenches of Urumtsi and Urungu, which descend west to the lowlands of Siberia towards Lakes Balkhash and Zaisan. Beyond the great depression the plateau rises again, and reaches an average height of from 4000 to more than 5000 feet in the upper parts of the Yenisei and Selenga, and about 2370 feet in its lowest part—the small depression of Lake Ubsa-nor. The Ektagh (or Great Altai) in the west, the Khangai and the Yablonovoi ridge farther east, separate this northern terrace of the plateau from the lower terrace of Eastern Turkestan and Gobi. It would seem that the Yablonovoi ridge is continued farther SW. by a succession of ridges which probably join the Tian-shan Pelau (Eastern Tian-shan), and which separate the higher western terrace of the plateaus from the lower terrace of the Gobi. This last has in the east its border-ridge—the Great Khingan (6000 to 8000 feet)—which is a continuation of the richly mineralised mountains of Shansi; it is pierced by the Amur below Albazin, and in the north-east joins the Stanovoi or Okhotsk coast-ridge.

In the north-west the plateau is bordered by the snow-clad Sailughem ridge of the Altai (Byelukha, 14,800 feet), which appears as a continuation of the Tian-shan and the Ala-tau, and which is continued farther NE. by the West Sayans. A wide indentation, however, occupied in its deepest parts by Lake Baikal (and very much like the indentation made by the Caspian in the plateau of Western Asia), breaks the continuity of the border-ridge. This last reappears again in the east of the Siberian lake as a huge wall, known under the names of Khamar-daban, Barguzin, Muya, and Tchara mountains. The Sayan ridges average 7000 feet above the sea, but reach a maximum 11,500 in the Munku-Sardyk, and present their steepest slopes towards Siberia (q.v.), while their inner base lies on a plateau 3500 to 4500 feet high. Between the Sayan and Yablonovoi ranges lies the broad Vitim-Selenga rift, where the valleys of the Selenga and its Uda tributary afford two great highways from Lake Baikal to Mongolia and the Upper Amur. A broad zone of alpine tracts more than 150 miles wide and 2000 miles long—the Altai, the Kuznetskiy Ala-tau, the Baikal, Lena, Olekma, and Vitim mountains—fringes this plateau in the west, from Lake Zaisan to the far north-east of Siberia. It consists of a series of short chains, mostly running NE., with numerous spurs, and intersected by deep and narrow valleys, clothed with forests and rich in auriferous deposits. A like succession of alpine tracts, although narrower, follows the south-east edge of the plateau in China and Manchuria. As to the plateau itself—whose surface is diversified by several chains rising above its level—its broad, flat, open valleys, though scarcely fit for agriculture in consequence of their altitude, have none of the dryness of the plateau of Tibet. They are covered with a rich grass-vegetation, and are frequented by shepherds; while the slopes of the hills, thickly clothed with forests, are rich hunting-grounds. Farther north, in the Vitim plateau, the Aldan, &c.—the surface becomes very marshy, and the vegetation still poorer; its height does not now exceed 3500 feet, and it becomes narrower. Its north-eastern extremity—the abode of the Tchuktchis—is but very little known.

(4) *The Plateau of Western Asia.*—Several parallel chains of mountains, reaching 24,000 feet in their highest parts, and running NE. to SW.—the Hindu-Kush and its parallel chains—connect the great plateau of Eastern with that of Western Asia, which may be subdivided into three parts: Iran, Armenia, and Asia Minor. The plateau of Iran (1,000,000 sq. m.) is bordered in the north-east

by the border-ridges of the Paropamisus, the Kopet-dagh, which presents its steep, stony slopes to the Turkoman Steppes, and the Elburz (with its peak Demavend, 18,000 feet high), which describes a curve around the South Caspian shore; in the east it is fringed by several snow-clad chains, which separate the stony plateaus of Afghanistan and Beluchistan from the fertile valley of the Indus; and in the south-west it falls by several steep terraces towards the Persian Gulf and its continuation—the valley of the Tigris and Euphrates. The lowest parts of the Iran plateau, in the valley of the Helmand, which discharges its water into the rapidly desiccating Sawarah swamp, are 3500 feet above the sea, and the plateau, although fertile in the south-east, merges, through karst landscape in salt-desert, towards the Caspian Sea. There it joins the plateau of Armenia, bounded on the north by the Anti-Caucasus, and in the south by the Kurdistan Mountains. The great salt lakes Van and Urmia have their levels at altitudes of more than 5000 feet; and Mount Ararat, which rises on the plateau, reaches a height of 17,900 feet. Farther west the plateau of Armenia meets that of Asia Minor, all three together making a wide plateau, elongated towards the north-west, and having a length of 2700 miles, and a width of from 700 to 180 miles. Several chains of mountains running NE. and NW., and reaching more than 10,000 feet in their loftiest summits, intersect the plateau of Asia Minor, which is bordered by the Taurus Mountains on its Mediterranean coasts, and the Pontic Mountains on the Black Sea shore.

(5) *Separate Chains of Mountains.*—The hilly tracts of Asia are not confined to the plateaus and their border-ridges. The Caucasus, an immense wall of snow-clad mountains, stretches NW. to SE. for over 700 miles along the border of the Armenian plateau, from which it is separated by the broad valley of the Kura. It reaches 18,530 feet in the Elborus (Elburz) peak. The Urals, from 2000 to 4000 feet high, which separate Europe from Asia, are a broad belt of hilly tracts, stretching as a whole from north to south. Farther east, the Karatau and the Tarbagatai, as also the Verkhoyansk ridge in the far north, strike off from the alpine tracts which fringe the plateau, and have a direction perpendicular to them; while the Byrranga hills diversify the monotony of the *tundras* of the Taimyr Peninsula. The Yeniseisk Mountains, consisting of several chains running SW. to NE., contain rich treasures of gold-dust. Several chains, little known, and some of them volcanic, fill up the peninsula of Kamchatka. A number of parallel chains, 5000 to 7000 feet high—the Ilkhuri-alin, the Bureya Mountains, Pribrezhnyi, and Tartar—run from the Gulf of Pechili to the Sea of Okhotsk, and are continued in Sakhalin Island; while other chains having the same direction form an outer submarine wall of Asia in Korea, the Japan Archipelago, and the Kuriles. The Nan-ling, Tayu-ling, and other smaller chains having also the same north-eastern direction, cross South China; and submarine chains belonging to the same system of parallel plaitings of the earth-crust are seen in the Taiwan (Formosa) and the Loo-choos (Liu-kius). The whole eastern margin—in the south from as far west as the Lower Brahmaputra—has a typical Pacific north-and-south trend, as opposed to the typical east-and-west trend of the main Eurasian mass from the Cantabrians to the Himalayas. It has an equally typical Pacific, or shallow, hinterland. A range of lofty volcanoes rises steeply from the very depths of the ocean in the islands of the Java Sea.

The interior of the Indian peninsula is again occupied by the wide plateau of the Deccan, having an average height of 1500 to 3000 feet, with an extreme of 8760 in the Nilgiris, bordered in the west by the Western Ghats and the Cardamom Mountains, and in the east by the much lower and broader Eastern Ghats. The Pedrotallagalla peak in Ceylon rises 8330 feet high.

The immense plateaus of Arabia, covered with sand-deserts interspersed with a few fertile regions, rise to altitudes of from 3500 to 4500 feet, and are intersected by several little-known chains of hills. Their south-eastern border-ridge—the Hadramaut—reaches nearly 7000 feet in its highest summits, and the north-western border-ridges—the Lebanon and Anti-Lebanon (Anti-Libanus)—have summits of 10,000 and 9000 feet; while in the deep valley of the Jordan the Dead Sea is no less than 1300 feet below ocean-level.

(6) *Lowlands, Plains.*—The whole of North-western Asia is occupied by an immense lowland—Siberia—which joins in the south the wide Aral-Caspian depression. This lowland, whose level is usually well below six hundred feet, does not reach the outer borders of the above-mentioned alpine regions which fringe the great plateau of East Asia. It is separated from them by a belt of elevated, undulating plains rising to a level of from 1000 to 1500 feet, the limits of which may be roughly indicated by a line traced from Merv to Tomsk, and thence to Verkhoyansk. These plains, which assume the character of dry steppes towards the south, are as a whole highly suitable for agriculture and cattle-breeding. Not so the lowlands proper, which bear unmistakable traces of having emerged from the sea during the Post-Pliocene period. In the Aral-Caspian depression they often have the character of sandy deserts, and can be cultivated only where there is a belt of fertile Löss (q.v.) at the base of the mountains, and the streams issuing from the hilly regions yield sufficient water for irrigation. On the northern coast of the Caspian, the Aral-Caspian depression descends even below the level of the sea; while the dry plateau of Ust Urt rises to an average height of about 1000 feet above the sea. The southern parts of Western Siberia are a perfect granary, and are rapidly being colonised; but beyond the 56th or 57th degree of latitude the lowland assumes the character of marshy forests, almost totally unsuitable for settlements; and farther north, that of a barren and almost always frozen tundra. A like belt of elevated plains, succeeded by one of lowland, runs along the great plateau on its south-eastern edge; and those parts of the plains which are covered in China with loess, as also those of Manchuria to the west of the Pribrezhnyi ridge, are the abodes of a dense agricultural population. In the Indo-Chinese Peninsula, the lowlands are limited to Tonkin, Cambodia, and the lower Menam and Irawadi, where they are fertile, but often marshy.

The wide space between the great plateaus of Western and Eastern Asia and that of the Deccan, watered by the Indus and the Ganges, is again an immense lowland, covering no less than 400,000 sq. m., and supplying the means of existence to 175 millions of inhabitants. Its western part suffers much from want of precipitation; but artificial canalisation rapidly conquers the desert (see INDIA). Another wide lowland, Mesopotamia, or the broad valley of the Tigris and Euphrates, was a cradle of civilisation (Sumerian) in the remotest antiquity. Finally, the fertile lowlands in the north of the Caucasus are being rapidly colonised by Russian agriculturists.

Rivers.—It is easy to perceive from the above rapid sketch how much the orographical structure of Asia favours the development of very great rivers, whose drainage basins cover immense areas. Only four rivers—the Mississippi, Amazon, Congo, and Nile—surpass the largest rivers

of Asia, the Yenisei and the Yang-tse-kiang, both as to length and drainage areas; but owing to the scarcity of rain over large parts of Asia, the amount of water carried down by the largest rivers is, as a rule, disproportionately small as compared with American or European rivers. The predominant feature of Asia's hydrography is the existence of very wide areas having no outlet to the sea. On the great plateau of Eastern Asia, the region which has no outlet from the plateau, and whose water does not reach even Lake Aral or the Caspian—the Han-hai and Gobi—covers a surface larger than that of Spain, France, and Germany together. It is watered only by the Tarim, which supplies some irrigation-works in its upper parts, and enters the rapidly drying marshes of Lob-nor. This area is steadily increasing, and since 1862 we have had to add to it the drainage area (as large as England and Wales) of the Keruleñ, which empties into Dalai-nor, but no longer reaches the Arguñ, a tributary of the Amur. The Ulyasutai River and the Tchagan-togoi now no longer reach Lake Balkhash; and the Urungu, which obviously joined the Upper Irtysh at no very remote date, empties into a lake separated from the Black Irtysh by a low isthmus not 5 miles wide. If we add, however, to this already wide area the drainage basins of Lake Balkhash with its tributaries, the Ili and other smaller rivers; the great Lake Aral, with the Syr-daria (Jaxartes) and Amu-daria (Oxus), as also the numerous rivers which flow towards it or its tributaries, but are desiccated by evaporation before reaching them; and finally the Caspian with its tributaries, the Volga, Ural, Kura, and Terek, we find an immense surface of more than 4,000,000 sq. m.—that is, distinctly larger than Europe—which has no outlet to the ocean. Four inland drainage areas more must be added to the above—the plateaus of Iran and Armenia, two separate areas in Arabia, and one in Asia Minor, the whole having a surface of 5,567,000 sq. m. See RIVERS.

The drainage area of the Arctic Ocean comes next. It includes all the lowlands of Siberia, its plains, and large portions of the great plateau. The chief rivers flowing north to the Arctic Ocean are the Obi, with the Irtysh; the Yenisei, with its great tributary the Angara, which brings to it the waters of Lake Baikal, itself fed by the Selenga, the Upper Angara, and hundreds of small streams; and finally the Lena, with its great tributaries, the Vitim, Olekma, Vilui, and Aldan. Owing to their great tributaries, and still more to the fact that each of them is formed by *two* great rivers of nearly equal importance, they permit navigation to be carried on, not only north and south, but also west and east, over wide distances in Siberia (q.v.).

Three great rivers enter the Pacific: the Amur, composed of the Arguñ and Shilka, and receiving the Sungari—a great artery of navigation in Manchuria—the Usuri, and the Zeya; the Hoang-ho, subject to frost, like the Amur, and to fierce floods, and of little value for trade; and the great Yangtse (with its tributary the Han), which allows freighted boats to penetrate from the seacoast to the very heart of China. The Cambodia or Me-khong, the Salwen, and the Irawadi, rising in the eastern parts of the high plateau, water the Indo-Chinese Peninsula. Rising on the same height, the Indus and the Brahmaputra flow through a high valley in opposite directions along the northern base of the Himalayas, until both pierce the gigantic ridge at its opposite ends, and find their way—the former to the lowlands of the Punjab, where it is joined by the Sutlej, and the latter to Assam and Bengal, where it joins the great river of India, the Ganges, before entering the Gulf of Bengal by a great number of branches forming an immense delta. The plateau of the Deccan is watered by the Godavari and Krishna, flowing east, the Narbada, flowing west, and a great number of smaller streams. The Tigris and Euphrates, both rising in the high plateau of Armenia, flow parallel to each other, bringing life to the valley of Mesopotamia, and join before entering the Persian Gulf. Arabia Proper has no rivers worthy of notice; only the *wâdys*, or dry channels of former rivers, show that there was a time, not far distant, when it was well watered. The Irmak, which enters the Black Sea, is the only river worthy of notice in Asia Minor. In Caucasus, the Rion and Kubañ enter the Black Sea, and the Kura and Terek the Caspian.

Inland Seas, Lakes.—Numberless lakes are scattered all over Asia. A succession of great lakes, or rather inland seas, is situated all along the northern slope of the high plateaus of Western and Eastern Asia, their levels becoming higher as we advance farther east. The Caspian, 800 miles long and 270 wide, is an immense sea, even larger than the Black Sea, but its level is now 85 feet *below* the level of the ocean; Lake Aral, nearly as wide as the Ægean Sea, has its level 157 feet above the ocean; farther east we have Lake Balkhash (780 feet), Zaisan (1200 feet), and Lake Baikal (1550 feet). Numberless smaller lakes and ponds, all rapidly drying up, break the surface of the steppes and lowlands of Siberia; while in the north, immense marshes cover the low grounds of Western Siberia. Many large lakes appear on the plateau of Tibet (Tengri-nor, Bakha) and on the high plateau of the Selenga and Vitim (Ubsa-nor, Ikhe-aral, Kosogol, Oron); and smaller lakes and ponds are so numerous that maps on a large scale are literally dotted with them. Three large lakes, Urmia, Van, and Goktcha, and many smaller ones, lie on the highest part of the Armenian plateau; whilst among the numerous lakes on the lower plateau of Anatolia, Tuz Geul is the largest. On the Pacific slope of the great plateau, the great rivers of China and the Amur with its tributaries have along their lower courses some large and very many small lakes, which seem like reservoirs where the immense quantities of water carried down by these rivers during the summer rains is stored. The lakes Tun-ting, Po-yang, and Tai-hu, along the Yang-tse-kiang; those along the former course of the lower Hoang-ho; and Lakes Kizi and Hangka on the Amur and Usuri, as well as numberless smaller lakes, fall under this category.

Geology.—Asia may be regarded as formed by the fusion of two ancient continents, Angaraland and Gondwanaland, separated till Tertiary times by a midland sea now transformed into Alpine chains; but these early continents were themselves formed by the fusion of ancient cores with younger peripheral growths—first Caledonian, and later Hercynian. Three persistent features, therefore, stand out, at all events from the Cambrian period—a northern nucleus (in South Siberia), a southern nucleus (in the Deccan), and a central depression, in which sedimentation seems to have been practically continuous, the site of the Tertiary Alpine folds. In the southern nucleus only the fundamental rocks have been folded, and the newer beds—from the Upper Palæozoic—lie on them horizontally and undisturbed except by faulting, the area having been land from at least the Carboniferous period. In the north and west of the continent the sea had retreated during the Devonian period, except on the site of the Urals, which was occupied by a gulf the size of the present Mediterranean; and this area also shows no important recent folding, though some mountains have been 'elevated' from other causes—e.g. the formation of tray-like or trough-like faults. In central Siberia, as in the north-west of the

Deccan, there have been great flows of lava. During the Jurassic period immense fresh-water basins covered the plateaus, and left their traces in Jurassic coal-beds. Carboniferous deposits are met with in Turkestan, India, and Western Asia; while in Eastern Asia the numerous coal-beds of Manchuria, China, and the archipelagoes are all Jurassic. The broad intermediate belt of Mesozoic and later formations has been folded into a series of arcs—lying east and west, and enclosing very slightly disturbed areas; and these now form the mountain backbone from the Taunus to the Himalayas, and even intrude into the 'Pacific' trend —e.g. following the direction of older folds in Burma before resuming their normal direction in Java, &c. The island festoons of the east coast are due to similar causes, though the natural coast-line is probably due to simple faulting. The mountain chains rose above the Carboniferous, Triassic, Chalk, and Jurassic seas which covered what are now the lowlands and lower terraces of Asia; but their upheaval has continued throughout these epochs, so that in the outer chains of Asia we see Carboniferous and younger deposits, up to Tertiary, lifted to great heights. It appears, however, that while the ancient upheavals dating from the azoic epoch had chiefly the direction from south-west to north-east, the more recent upheavals of the Tertiary period have had a direction from north-west to south-east.

What are now the lowlands of Asia must have been widely submerged by the seas of the Tertiary period, as also those of the Quaternary (postpliocene) period. The Tertiary sea of Eastern Asia was broken by chains of mountains into many separate parts, straits and lagoons, while that of Western Asia extended widely over what is now Southern Russia. The sea of the Quaternary period (glacial and post-glacial) no longer reached the plains of Central Asia, nor even the higher plains of Siberia. It covered the whole of the lowlands of North-western Siberia, as far as the 50th degree of latitude, a broad gulf probably connecting the Arctic Ocean with the Aral-Caspian Sea; but there are no traces of it on the high plains of Eastern Siberia, which were only intersected by several narrow elongated gulfs of the ocean. The moistness that thus ensued permitted glaciers (which are wanting now throughout the middle parts of Eastern Siberia and Mongolia) freely to accumulate, so that the whole of the upper plateau and its border-ridges were under a mighty ice-cap. Immense glaciers, like those of the Alps and Jura, covered also the alpine regions. How far glaciation extended over the plateau of Tibet and in China still remains unsettled. In Turkestan and Siberia, immense accumulations of loess fringe the alpine regions; while in China they cover immense tracts, and are the most fertile regions of Asia.

Many important changes in the distribution of land and water have been going on in Asia since the glacial period, and even during historic times. Since the Aral-Caspian Sea became isolated from the ocean, its desiccation, as well as that of the numberless lakes which dotted the surface of Asia during the Lacustrine (post-glacial) period, has proceeded with a rapidity which may be guessed from the very rapid rate at which the process has been observed to go on in Siberia during the last hundred years. All Asia bears unmistakable traces of having been covered during the Lacustrine period with numberless large and small lakes, which have now disappeared, not in consequence of the action of man, but in consequence of some general causes affecting the earth's surface since the last glacial period. The process is still more accelerated by the rapid upheaval of the continent—the whole of the Arctic coast, as also most of that washed by the Pacific, the Mediterranean, the Red Sea, and parts of the Indian Ocean, being in a state of gradual elevation, while the few areas where traces of subsidence have been noticed are very limited. The influence of the desiccation of Asia has been felt even during historic times, and the migrations of the Ural-Altaians, Turks, and Mongols will probably be best explained if this change in the condition of Central Asia be taken into account; while the same circumstance explains the nearly desert state of those regions which were the cradle of European civilisation.

Volcanoes play an important part in Asia's geology; more than 120 active volcanoes are known in Asia, chiefly in the islands of the south-east, the Philippines, Japan, the Kuriles, and Kamchatka, and also in a few islands of the Sea of Bengal and Arabia, and of Western Asia. Numerous traces of volcanic eruptions are found, not only in the same regions, but also in Eastern Tian-shan, in the north-western border-ridges of the high Siberian plateau, and in the south-west of Aigun in Manchuria. Earthquakes are frequent, especially in Armenia, Turkestan, and around Lake Baikal.

Minerals.—Asia is exceedingly rich in a great variety of mineral products. There are gold mines of great wealth in the Urals, the Altai, and Eastern Siberia; and auriferous sands are found in Korea, Sumatra, Japan, and in the Caucasus Mountains. Silver is extracted in Siberia; platinum in the Urals; copper in Japan, India, and Siberia; tin in Malayia; mercury in Japan. Iron ore is found in nearly all the mountainous regions, especially in Asia Minor, Persia, Turkestan, India, China, Japan, and Siberia; but iron mining is still at a rudimentary stage. Immense coal-beds are spread over China and the islands of the Pacific (Hainan, Japanese Archipelago, Sakhalin), Eastern Siberia, Turkestan, India, Persia, and Asia Minor. They cover no less than half a million square miles in China alone; but the extraction of coal is as yet very limited. Graphite of very high quality is found in the Sayans and Northern Siberia The diamonds of India, the sapphires of Ceylon, the rubies of Burma and Turkestan, the topazes, beryls, &c. of the Urals and Nertchinsk, have a wide repute. Layers of rock-salt are widely spread, and still more so the salt lakes and springs. The petroleum wells of the Caspian shores, though still producing 20 per cent. of the world's output, are not prospering, partly owing to the competition of the great oil-field which runs from Burma through the Dutch East Indies into Borneo. When modern industry shall spread over the great eastern continent, it will find at hand the best specimens and the greatest variety of mineral products, although it will have to vanquish the obstacles opposed to their extraction by the difficulties of access of the mountain tracts.

A variety of mineral springs, some of them equal to the best waters of Western Europe, are widely spread over Asia. Those of Caucasus and Transbaikalia already attract a number of patients.

Climate.—Even Eastern Europe has quite a continental climate. Still more continental is the climate throughout Asia, with the exception of a part of its coast regions. On account of the immense area of Asia, great differences of climate are met with, and therefore the meteorologists subdivide the continent into several climatic regions. (*a*) The province of Western Siberia, purely continental, is very cold in the winter and hot in summer. (*b*) Eastern Siberia is still more continental, colder in winter, and drier; it includes the pole of cold about Verkhoyansk, under 67° 34′ N. lat., which

is the coldest known spot in the whole world; each wind, whatever its direction, brings to it a warmer air, and its average yearly temperature is no more than 2° F., while that of January is 59° below the freezing-point of the Fahrenheit scale. See TEMPERATURE (TERRESTRIAL). (*c*) The Kamchatka province, receiving much more rain than the preceding, is moister and more genial. (*d*) The Chinese have a cold winter, and receive in the summer the periodical rains due to the monsoons; in Japan the climate is much the same, but more moderate. (*e*) The Central-Asian plateau is characterised by an exceedingly dry climate, with very cold winters, the cold being increased by its height above the sea-level. (*f*) The same exceeding dryness of climate is met with in the Aral-Caspian lowland, with its scanty rains and depressingly hot summer; and the same again is true with regard to (*g*) the Arabian region and Mesopotamia, which together may be considered as an eastern continuation of the Sahara. (*h*) The Mediterranean region, including Asia Minor, enjoys the best climate, reasonably moist, and more moderate in its extremes of temperature. (*i*) The valley of the Lower Indus, whose climate is dry and very hot, must be considered as a separate region; while (*k*) India, the Indo-Chinese Peninsula, and Australasia have a tropical climate, characterised by abundant periodical rains, especially in the summer, and a limited range of temperature. In winter Asia is abnormally cold except along the south coast, and in summer it is abnormally hot except along the east coast. South of the pole of cold, and modified by it, a pear-shaped area of very high pressure (30·5) results in winter in outflowing winds to every point of the compass (*cf.* the NW. monsoon of China and Japan); and similar local causes in North-west India, which is climatically isolated by the great Himalayan barrier, send a NW. monsoon over the Ganges valley. In summer a vast area of low pressure (29·7) from west of Arabia to east of the Gobi is associated with a general inflow of moist winds from all the surrounding oceans, felt even in Poland, and marked by strong monsoons in Eastern and South-eastern Asia; and within this general inflow there is a special inflow to a focus of high temperature and low pressure in North-west India, giving WSW. monsoons to the Bombay coast, and SSW. monsoons to Bengal.

Such a régime obviously involves a most unequal distribution of rain. Winter rains may be expected only where outflowing winds have passed over open sea—e.g. in Japan, Annam, Madras; and even in summer heavy rains are confined to the east of a line from Okhotsk to Lhasa and south of the Himalayas. Across the continent from west to east, between 50° N. and 60° N., there is a belt of very useful rainfall, associated with some winter snow; and both north and south of this there is a narrower belt of less rainfall; but the total *annual* fall for the mass of Central and South-western Asia is under 10 inches. In the monsoon region, however, no area east of the above line has a rainfall less than that of London; in the warmer latitudes and at the higher elevations large areas get from 60 to 80 inches; and special areas have excessive falls—e.g. 100 inches on the Konkan lowland and 13 *yards* on the Assam hills, where 25 yards has been measured.

Flora.—A single domain of vegetation stretches from Scandinavia to the Pacific, across the northern half of the Old World. Only a narrow strip of land along the shores of the Arctic Ocean, where tree vegetation is represented only by two species of dwarf willows, 2 or 3 inches high, and by shrubs of the dwarf birch, is considered as a separate region—the *tundra* region, which extends from the White Sea to the north-eastern extremity of Asia. It is the true domain of lichens and mosses, which clothe the deeply frozen ground; but in the few sheltered places where some soil has accumulated, we find hundreds of our common European flowering plants. The remainder of Siberia is included in the European-Asiatic boreal domain. Forests cover these extensive tracts, both in the hilly districts and in the marshy lowlands of Western Siberia, and they consist of the same trees (pine, fir, larch, silver-fir, birch, aspen, and poplars) with which we are familiar in Europe. Only the red beech, which even in Middle Europe does not advance farther east than Poland, does not penetrate into Siberia; and the oak does not cross the Ural, reappearing only on the south-eastern slope of the great plateau. Generally, the differences from Europe are due to variations of species rather than of genera—e.g. of larch and fir among conifers. Nevertheless, the forests of Siberia differ widely from those of Europe in the predominance of the larch, the rarity of the Scots pine, which grows only on the drier ground, and the very characters of the trees, compelled to accommodate themselves to a harsh climate, and to a soil either stony or swampy. The underwood of the Siberian forests also offers a richer variety of species, and many a bush, now a favourite in our gardens for its wealth of blossom (*Pirus baccata*, *Robinia caragana*, *Lonicera tatarica* and *cærulea*, *Clematis*, *Rhododendron*), has its home in the alpine tracts which border the great plateau on the north-west. On the meadows which cover immense areas both on the lowlands and high plains, the vegetation, as a whole, differs but slightly from that of Eastern Europe; but it has a very different appearance, on account of the immense size reached by many grasses with hard, woody stems, and the brilliancy of their showy flowers. Peonies, aconites, gentians, asters, and the like, in the spring-time impart such a brightness to the meadows of the Baraba Steppe in Western Siberia, and still more of the high plains of Minusinsk and Transbaikalia, as makes our European meadows appear exceedingly tame in comparison with those of Siberia. Corn grows freely throughout the region, except in places having a great altitude, where early frosts destroy the crops. Barley is cultivated even at Yakutsk, where it ripens rapidly during the hot summer, and under the greater amount of light received in these high latitudes. But fruit-trees, although they blossom every year, yield no fruits; the late May frosts nip their blossom.

This wide vegetation-region, which occupies all Northern Asia, is bounded on the south by a line traced roughly from the Black Sea to Lake Baikal, and thence to the Upper Amur and the Sea of Okhotsk. It has not, however, the uniformity it may be supposed to have from a glance at a geo-botanic map. While the species freely spread from west to east on the lowlands of Siberia, they spread quite as easily from south-west to north-east, both along the high plains and the alpine regions which border the high plateau in the north-west, and over the plateau itself. Therefore, even the Siberian flora is easily subdivided into several separate regions. Thus we see the stone pine spreading all along the highest parts of the north-west border-ridge of the high plateau, from the Altai to the Lena; we find the same vegetation on the high plateau of the Kosogol and on the Vitim; the vegetation of the high plains of the Altai offers features common to that of the high plains west of Lake Baikal; and the Transbaikalian flora partakes of the characters of the Gobi. As soon as the Amur issues from the high plateau, we find on its banks the Chinese

CARIBBEAN SEA
NORTH ATLANTIC OCEAN
SOUTH ATLANTIC OCEAN
PACIFIC OCEAN
VENEZUELA
COLOMBIA
ECUADOR
PERU
BOLIVIA
BRAZIL
PARAGUAY
ARGENTINE REPUBLIC
CHILE
BRITISH GUIANA
DUTCH GUIANA
FRENCH GUIANA
Equator
Tropic of Capricorn
Falkland Islands (Brit)
SOUTH AMERICA
English Miles
Kilometres
Cape Horn
Longitude West 50 of Greenwich

PHYSICAL MAP OF
SOUTH AMERICA
English Miles
0 200 400 600
Kilometres
0 200 400 600 800 1000
Lowlands Under 600 Feet
Highlands Over 600 Feet
Warm Currents
Cold Do
CARIBBEAN SEA
NORTH ATLANTIC OCEAN
SOUTH ATLANTIC OCEAN
PACIFIC OCEAN
CENTRAL AMERICA
West India Islands
Trinidad
Delta of the Orinoco
Mouths of the Amazon
Para
Pernambuco
Bahia
Rio de Janeiro
Cape Frio
Trinidad I.
Fernando Noronha
C. S. Roque
C. Branco
Abrolhos
Banana I.
Plateau of Matto Grosso
Plateau of Bolivia
El Gran Chaco
Llanos of the Orinoco
Highlands of Guiana
Sierra Acaral
Selvas of the Amazon
River Amazon
Andes
Pampas
Brazil Highlands
Brazil Current
Peruvian or Humboldt Current
Antarctic Drift
Rainless Coast
Isthmus of Panama
Gulf of Panama
Gulf of Guayaquil
Equator
Galapagos Is.
Chincha Is.
Lobos I.
Juan Fernandez
Chiloe I.
Chonos Archipelago
Wellington I.
Falkland Is.
Stanley Har.
Tierra del Fuego
Cape Horn
S. Georgia
Shingle Desert
Atacama Desert
Desolation
Lima
Valparaiso
Buenos Ayres
Rio de la Plata
Lagoa dos Patos
S. Catharina
Serra Geral
Serra do Mar
Serra dos Parecis
Serra Tapirapoan
Serra Pacaraima
Sierra Parima
Sierra Pacaraima
Sierra Tumucumaque
Sierra Imataca
Sierra Parima
Sierra Duida
Sierra Neblina
Sierra Cupaxi
Sierra Cocuy
Sierra Nevada
Sierra Merida
Sierra Perija
Sierra Nevada de Santa Marta
Sierra Nevada de Cocuy
Sierra Nevada de Merida

and Japanese flora under the same latitudes as the purely Siberian flora in the west. Finally, it appears from recent investigations that even about Lake Balkhash and at the foot of the Tian-shan we have remainders of a European-Siberian flora, which has maintained itself on the better-watered slopes.

The next vegetation zone marked on our maps is that of the Steppes, which extends from the Steppes of South-eastern Russia over the Aral-Caspian depression and the middle parts of the high plateaus of Western and Eastern Asia, including several separate desert-regions (the Han-hai, the Gobi, the dry interior parts of Arabia, Persia, and North-western India). This wide region ought to be divided in Central Asia alone into at least four sub-regions: the Aral-Caspian, the Tian-Shan, the Tibetan, and the Mongolian floras. The excessive dryness of climate gives to this region its characteristic aspect. Tree vegetation maintains itself only on the snow-covered mountains, which supply permanent moisture to the soil, while on the drier southern slopes, the Steppe vegetation climbs up to the limits of perennial snow. Only those bushes prosper which, like the Artcha (*Juniperus pseudosabina*) and Saksaul (*Anabasis ammodendron*), have hardly any leaves, giving a dreary aspect to the Aral-Caspian Steppes and the base of the Tian-shan Mountains. The Steppes, the surface of the high plateau, and even (during the spring) the dry deserts, are covered with a rich carpet of nutritious grass. The vegetation of the Steppes is reduced to a few species, chiefly of *Festuca*, *Stipa*, *Artemisia*, and *Salsola*. In the dry regions of Arabia, the flora assumes a decidedly African character, owing to the presence of the gum-acacia and the date-palm.

The flora of the region to the east of the high plateau, including China, Manchuria, and Japan, must be considered as an East-Asiatic equivalent for the Mediterranean flora of Europe. Oak reappears as soon as the eastern border-ridge of the plateau is crossed. So also the walnut, the hazel, the lime-tree, the maple; while several new species of poplars, willows, and many others, make their appearance. The forests, consisting of a most mixed vegetation, where southern species meet with northern ones, become really beautiful; in Japan a variety of species of pine, and the reappearance of the beech, add to their beauty. A rich underwood of lianas (ivies, wild vines, roses, and so on) renders the forests quite impassable, especially in the littoral region, which is submitted to the influence of the monsoons. In the lower parts, rich prairies cover immense spaces; the grass vegetation becomes luxuriant; and in the virgin prairies of the Amur, man and horse are easily concealed by the stems of grasses of gigantic size. Rice and cotton are cultivated in the southern parts of the region. The gradual replacing of southern species by northern permits the separation of the Chinese flora from that of Manchuria and the Okhotsk littoral. The Chino-Japanese flora shows affinities with North American.

In Western Asia, the rich vegetation of the moister parts of Caucasus and the southern shores of the Caspian belongs to the Mediterranean flora of Europe. The beech is characteristic of the forests of this district, which besides contain all the trees of Southern Europe. The vine and several of our common fruit-trees, especially stone-fruit (plum, cherry, apricot, pear), used to be regarded as belonging originally to this part of the world. In its flora, Asia Minor belongs to that region which, owing to its evergreen oak, laurel, olive-tree, myrtle, oleanders, rock-roses, &c., shows broadly a remarkable uniformity all round the Mediterranean.

Southern and South-eastern Asia, with their numerous islands, display the richest flora, which seems quite distinct from the above, and extends as a separate domain of vegetation over India, the Indo-Chinese Peninsula, and the archipelagos, and reaches Australia (*cf.* the Casuarina in Java). The hot climate, and the great amount of the summer rains, with a relatively dry winter, contribute to the development of a rich tropical vegetation. Thanks to the abundance of moisture, the higher parts of the region, particularly the Himalayas, are clothed on their southern slopes with forests up to heights of 12,000 and 13,000 feet. The vegetation of the higher hilly tracts is very like the European. Numbers of plants growing on the Himalayan summits are common to all Arctic regions, showing thus the unity of flora of the Old World at its issue from the glacial period. Lower down, in the forest-girdle, pines, juniper, and yew-trees are quite like their European congeners. The Indian cedar or 'deodar' yields good timber—a rarity in India, but *cf.* sal and teak—while in the underwood rhododendrons, growing sometimes 90 feet high, at heights about 8000 feet above the sea, are noteworthy.

In the lower parts of the region, and especially the neighbourhood of the sea-coasts, the tropical vegetation reaches the variety and size of the American. Here the sugar-cane, the cotton-shrub, and the indigo had their origin. The coconut-palm and the banyan-tree are the most striking feature of the coast vegetation. Ferns reach the size of large trees. The gigantic banyan, under whose branches hundreds of men can find a shelter, the screw-pine (*Pandanus*), the indiarubber, and the red cotton trees grow in immense forests; and bamboos grow thick and high.

In Borneo, Java, and the islands of the archipelagos, the tropical vegetation is, in its broad features, the same as in India. The mountain-flora also is like that of the Himalayas; rich forests clothe the volcanoes up to their tops. The sago-palm, the bread-tree, imported from the South Sea Islands, and the tamarind, also imported, are largely cultivated, as also the coconut-palm and the sugar-palm. Orchids appear in their full variety and beauty. The swamps are covered with mangroves, or with the anomalous-looking Nipa or Susa-palm; and pepper, clove, and nearly all the spices are native to this region.

It is easy to see from the above what a variety of useful plants Asia, according to some, has given to Europe. Wheat, barley, oats, and millet may come from Western Asia; so also onions, radishes, peas, beans, spinach, and several other vegetables of our kitchen-gardens. Nearly all our fruit-trees have been assigned to the same origin, as apple, pear, plum, cherry, almond, pistachio, and mulberry-tree; the raspberry and even lucerne have perhaps been imported from Asia to Europe.

Fauna.—Nearly the whole of continental Eurasia, with cis-Atlas Africa, is considered as constituting a single domain—the Palæarctic region; and the immensity of this zoö-geographical region is easily accounted for by the ease with which animals, especially birds, could spread over the vast monotonous plains and plateaus of Eurasia, and by the original continuity of Europe and North Africa—conditions adverse to similar community in the fishes. But this wide region can be easily subdivided—e.g. into the Arctic region, which shares its characters with Arctic regions generally; the boreal, embracing the lowlands of Western Siberia; the Daurian, in the northern parts of the great plateau; and the Central Asian. The fauna of Siberia is much like that of Eastern Europe, and would be still more like, were it not for the disappearance from Europe of several species still existing in Siberia It is the true habitat of all

fur-bearing animals, as the bear, wolf, fox, sable, ermine, otter, beaver, common weasel, and squirrel; as also of the hare, the wild boar, the stag, the reindeer, and the elk, all belonging to the European faunas, with the addition of several species common to the Arctic fauna. In Eastern Siberia, however—i.e. in the northern parts of the high plateau—we find representatives of the fauna of Central Asia, which spread from the south-west (see SIBERIA). A further addition of Mongolian species is found on the lower plateau in Transbaikalia, where the fauna of the Central-Asian depression meets with that of Siberia.

The Central-Asian plateau has a fauna of its own; we find there the wild ancestors of several of our domestic animals—viz. the wild horse (*Equus Przewalski*), discovered by Przewalski (Prejevalsky) in the Ala-shan Mountains, the wild camel and donkey, and the *Capra ægargus*, from which our common goat is descended. The yak, several species of antelopes, and the roebuck are characteristic of the Central-Asian fauna; so also are the huge sheep (*Ovis argali* and *Ovis polii*), now disappearing, which found refuge in the wilder parts of the plateaus. In the Steppe region we find the same fauna as in Siberia, with the addition of the tiger, which occasionally reaches Lake Zaisan, and even Lake Baikal, though India is its true home. The extreme south-west, from Arabia to Sind, comes with Africa, south of the Atlas, into Sclater's Ethiopian region; *cf.* the lion.

The fauna of mammals in China, Manchuria, and Japan differs but little from the Siberian. The difference is mainly notable with regard to the birds, among which the pheasants are richly represented. Several Indian species also penetrate within this region. The Caucasus has a fauna belonging to the Circum-Mediterranean region, and it is worthy of notice that the bison, which has now completely disappeared from Europe (with the exception of the Byelovyezh forests in Western Russia), is still found in the forests of Caucasus; there we find also the same abundance of pheasants as on the Pacific littoral. The fauna of Asia Minor unquestionably belongs to the Circum-Mediterranean region, and includes representatives of the warm zone—viz. small apes, which spread from Africa into Persia, the porcupine of Southern Europe, and the Genette (q.v.) or Genet.

Southern and South-eastern Asia belong to a separate 'Indian' domain. The heights of the Himalayas have the fauna of the Tibet portion of the high plateau; but on their southern slopes the fauna is purely Indian and Transgangetic, though a few African species are found on the plains of India and in the Deccan. As a whole, the tropical fauna of Asia is richer than the African, and the American tropical fauna surpasses it only in the number of parrots and the family of Picariæ. It is characterised by the great number of carnivora, which find ready refuge in the jungles, and by the elephant, rhinoceros, wild buffalo, red deer, many long-armed apes and half-apes, vampires, genets, and a variety of serpents and crocodiles; while the bird fauna includes nearly every order, and has many peculiar genera. East of Wallace's Line the fauna is 'Australian;' in Bali there were no opossums or cockatoos, and in Lombok there were no monkeys or woodpeckers.

The fauna of Asia, as of Europe, has undergone notable changes since the glacial period. The mammoth and hairy rhinoceros have disappeared, and their skeletons are buried in innumerable quantities in the great glacial deposits. So also the cave-bear, tiger, wolf, and hyena. Even within historic times, several species of mammals, such as the bison, have all but disappeared, while others are now to be found only in very small numbers in the wildest parts of the high plateau.

Ethnography.—The aggregate population of Asia is estimated at 975 millions, being thus more than one-half of the entire population of the globe. In comparison with the total area of Asia, this population is nevertheless small, giving only an average of 55 inhabitants per sq. m. It is, however, very unequally distributed, varying with the rainfall, the density in the monsoon area being prodigious. In India, over an area of *c.* 1,800,000 sq. m., it *averages* nearly 180 per sq. m., reaching over 500 in Oudh. In China, over an area of *c.* 1,500,000 sq. m., it *averages* 265 per sq. m., and reaches over 500 in Fukien, Honan, and Hupeh; while in Shantung it exceeds 700. On the contrary, seven-tenths of the continent have scarcely more than from 3 to 20 inhabitants per sq. m.; and nearly one-tenth is almost quite uninhabited.

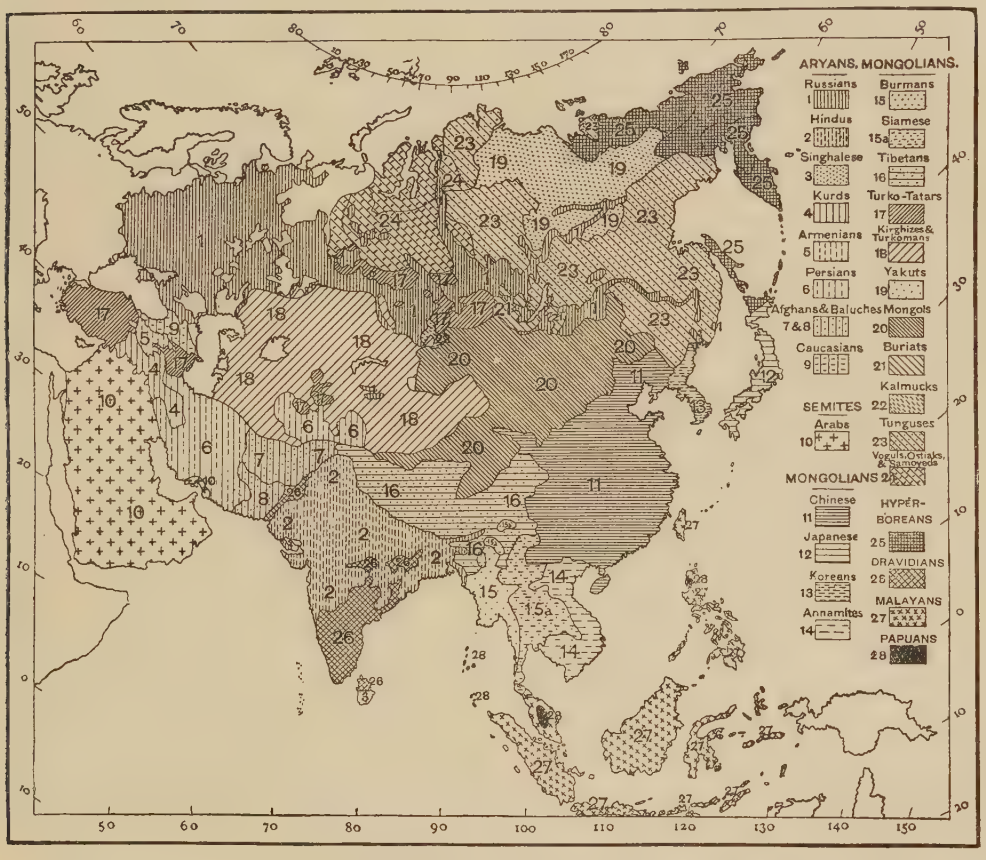
Having been inhabited by man since the earliest period of the stone age, and having been moreover the theatre of so many migrations, Asia has but few human races free from mixture with other races. Nevertheless, the hindrance to mutual intercourse opposed by its mountains, and still more by its high plateaus and deserts, prevented the mingling of races and stems to such an extent as in Europe; therefore we find now in Asia the greatest variety of ethnological types and languages. And distinct stems in the less accessible tracts, numbering now but a few families, are sometimes the last remainders of great races. Asia is essentially the home of the Mongol type, so widely distributed as to be divided into Northern and Southern secondary races. It had its area of characterisation on the central and eastern plateaus, while a somewhat similar round-headed 'Alpine' type arose on the western plateaus. The northern lowlands were occupied by a relatively fair, long-headed 'Proto-Nordic' (Haddon) type, and the Turki of the Altai and the Finno-Ugrians from the Upper Yenisei probably represent intermarriage of Proto-Nordic and Alpine types. The southern lowlands were occupied by a dark, long-headed 'Proto-Aryan' or 'Melano-Indian' (Deniker) type, represented by the Dravidas, who were flanked by maritime Indonesians of the monsoon islands and coast-lands. The dry heat of the western interior gave the Assyroid and Arab type, and Indo-Afghans occupied the eastern part of this dry interior and the western part of the monsoon interior. The west-central area of the continent seems to have been the home of a family of Aryan languages, obviously akin to Sanskrit and Zend (of which we have the archaic forms preserved), and at least equally akin to Lithuanian and some other European languages (of which we have no archaic forms preserved). Meyer believes that these Aryan-speaking people did not disperse from the Turan basin till *c.* 2000 B.C. Some of them certainly introduced the horse into Babylon *c.* 1900 B.C., and others seized the pasture-lands of the Punjab *c.* 1700 B.C. It is inconceivable to a geographer that the 'Aryan' home was in an area showing such extraordinary poverty of native flora and native fauna as Scandinavia (Penka).

In further subdivision according to language: The Caucasian race embraces (1) tribes and stems in Caucasus (Georgians, Lezghians, Circassians, &c.); (2) the Semitic branch, partly mixed with others, and subdivided into northern and southern; it comprises the Jews and the Arabs; and (3) the Indo-Aryan branch, containing (*a*) the Indians, whose languages, besides Hindi, spoken in Central India, include several spoken in Kashmir and the Punjab, Hindustani or Urdu, Sindhi, Marathi, Bengali, and Assami; (*b*) the Iranians (Persians, Tajiks, and Zendo-Afghans, Kurds, and Ossetians);

and (*c*) the Armenians. To these must be added the Russians and other Europeans.

The Mongolian race embraces three great linguistic families: (1) the Mongolo-Turki (Ural-Altaic) of the great lowland, in which Japanese and Korean stand apart, but all the rest—from Finland to Manchuria, and from the Yakuts to the Kirghizes—are typically agglutinating, with shifting postfixes; (2) the Tibeto-Indo-Chinese, of the great plateau and its monsoon edge, in which phonetic decay has reduced an originally agglutinating order into typically monosyllabic languages, toned and isolating; and (3) the untoned, but more or less agglutinating 'Oceanic' family of the Malayo-Polynesia area.

The mass of Northern Asia—steppe, taiga, and tundra—is occupied by Mongolo-Turki or 'Mongolo-Tatar' peoples, except for the Palæasiatics or Hyperboreans of the extreme north-east (Eskimo, Tchuktchi, Koriak, Yukaghir, Ainu), and the Russians who have spread along the Trans-Siberian line. The Tunguses north of the Amur, e.g. the Lamuts, have their Mongol type modified by the Hyperboreans; those south of the Amur, e.g. the Manchus, are being absorbed by the Chinese. The Yakuts are the northern representatives of the old Altaian-Turki stock, as the Samoyads are of the old Yeniseian Finno-Ugrian stock, while the Kirghiz-Kazaks (Cossacks, 'Riders') represent the western movement of the Turkis. The name Tatar is



Ethnographical Map of Asia.

wrongly applied to these Turki peoples, for the real Tatar were pure Mongolians (easterns), and the Turkis have been so much modified by long contact with (western) Caucasic peoples that they remain distinctively Mongol only in their Ural-Altaic speech—e.g. the Magyars and Finns.

The Dravidian race, which formerly peopled all India, is now reduced to the mountain tracts of the interior and to Southern India, and is represented by (1) the Dravidas proper, including the Tamuls, Telingas, Canarese, and other smaller stems; (2) the Kolarian tribes; and (3) the Singalese, whose language—Elu—must be considered, however, as quite separate.

The Negritos are now found only in the less accessible forests of the interior of Malacca, and on the Philippine and Andaman Islands.

Religions.—Since the dawn of history, Asia has been the birthplace of religions which spread all over the continent and the other parts of the world. The four great religions which are professed by the great majority of mankind—the Jewish, Buddhist, Christian, and Mohammedan—had their origin in Asia, where they grew up under the influence of still older religions—the Babylonian and that of Zoroaster—both also of Asiatic origin. Multitudes of new sects, or religions, mingled together, and exercising influence upon one another, are continually growing on the soil of Asia. At present the inhabitants of Asia belong chiefly to the Buddhist religion, which—inclusive of the followers of Lamaism, the moral philosophy of Confucius, and the teachings of Lao-tse, who all accept more or less the Buddhist ritual—has probably

from 500 to 560 millions of followers—i.e. nearly one-third of mankind. The old faith of Hinduism has no less than 217 millions of followers in India. Most of the inhabitants of Western Asia, as also of part of Central Asia, follow the religion of Islam; they may number about 80 millions. The Christians number nearly 29 millions in Armenia, Russian Asia, and India. Many of the Ural-Altaians continue to maintain their ancient faith—Shamanism—though a number of them are nominal followers of the Buddhist or the Christian religion. Jews are scattered mostly in Western and Central Asia. A few fire-worshippers—Guebres or Parsi—in the west of India and Persia, are the sole remnant of the once widespread religion of Zoroaster; while vestiges of Sabæism are found amidst the Gesides and Sabians on the Tigris.

Civilisation.—Together with Egypt, Asia contributed greatly to the present European civilisation; but, owing to many circumstances, partly physical and partly historical, the development of Asia proceeded on independent lines, and, as a whole, it may be considered as behind the civilisation of Europe. The current of civilisation, which formerly moved from Asia to Europe, returns now from west to east—unhappily, too often in its worst shape, that of conquest. Many a civilisation which grew up, either in South-western Asia or on the northern slope of the great plateau, has been swept away by invasions of less civilised half-nomads. At present one finds in Asia all varieties of civilisation—the primitive tribes of North-eastern Siberia, the confederations of nomadic shepherds, and great nations in possession of a common stock of national customs, beliefs, and literature, like China; the tribal stage; the 'compound family,' forming the real basis of China's social organisation; the rural community, both of the Indian (also East European) and Mussulman type; the loose aggregations of Tchuktchis, having no rulers, and no religion beyond the worship of forces of nature, but professing with regard to one another principles of morality and mutual support often forgotten in higher stages of civilisation; and (till of late) despotic monarchies, with a powerful clergy. So also in economic life. While the tribes of the north-east find their means of subsistence exclusively in fishing and hunting with the simplest implements, among which stone weapons have not yet quite disappeared, and the tribes of Central Asia carry on primitive cattle-breeding and lead a half-nomadic life, others are agriculturists, and have brought irrigation (in Turkestan) to a degree of perfection hardly known in Europe.

Political Conditions.—Viewed in its broad features, universal history appears as a long record of the mutual intercourse of Asia and Europe, and of struggle between them. While the countries beyond the great plateau entered but quite recently within the domain of western history, those on its Mediterranean slope have never ceased to exercise a powerful influence on Europe. At the very dawn of written history—that is, forty centuries before our era—the great Akkadian empire already influenced the inhabitants of the coast of the Mediterranean. Later on the Phœnicians extended their authority over Northern Africa and the Ægean Sea; the Persians modified the development of Egypt; and at a very remote epoch, the date of which cannot be yet ascertained, an oasis of high civilisation, grown up at the base of the Altai Mountains, spread itself to the west over Northern Europe. On the other hand, as soon as Greece, which had borrowed so much from Asia, brought her civilisation to such a pitch as to become the cradle of European culture, she tried to extend her rule over the decaying empires of Western Asia. Alexander of Macedon pushed his conquests as far as Turkestan; and later on Rome conquered Western Asia. But the Greek and Arabian civilisation in Central Asia decayed under the raids of Mongolian tribes; the Roman empire was absorbed by the East, and fell into decay at the very confines of Asia, on the shores of the Bosporus; the Arsacides and Sassanides of Persia repulsed the Roman aggression and conquered Roman provinces, while it was to mass movements from Asia into Europe that the great migrations of the first centuries of our era were due. Ural-Altaians migrated to the Urals, and thence to Hungary. Other Turanians—the Mervs, the Alans, the Avars—penetrated into Europe from the south-east; Mongols abandoned their rapidly desiccating plateaus, and invaded the Russian plains; the Arabs, following the south coast of the Mediterranean, invaded Spain; and the empire of the Osmanlis arose on the ruins of the Eastern Roman empire. By these invasions Asia arrested the free development of Europe, and compelled the Germanic, Gallic, and Slavonic federations to gather into powerful states of the Roman monarchical type.

A new epoch in European history began after the development of European navigation, when Portuguese ships, rounding the Cape, founded the first European colonies in India. They were soon followed by the Spaniards, the Dutch, the French, the Danes, and the British, all endeavouring to seize the richest colonies in Asia; while Russia, in the course of a few centuries, conquered and partly colonised the best parts of the immense flat prairies and forest-lands on the north-western slope of the high plateau, and crossing its narrow extremity in the north-east, reached the Pacific. Great Britain established herself in India, and expelling thence her competitors from all but a few spots on the sea-coast, still held by Portuguese and French, she took possession of the whole of the peninsula, and extended her powers over the western parts of the Indo-Chinese Peninsula. The Dutch have under their dominion most of the East India Islands. Spain lost the Philippines to the United States, and sold the Carolines and the Ladrones or Mariannes to Germany. These German islands are now under Japanese mandate. France has consolidated its power in Indo-China. China, till the war with Japan in 1894–95 regarded as the third power in Asia (after Britain and Russia), has sunk into a subordinate place; Japan is now the foremost native Asiatic power, especially since the war with Russia in 1904–5. Most European nations have, like Japan, intrigued and bullied for leases and concessions in China. Turkey, since the Great War almost a purely Asiatic state, has lost much even in Asia; Arab states have become independent or been placed under French and British mandates.

Produce.—The amount of cereals—rice, millet, wheat, barley, oats, &c.—supplied by the rich corn-fields of China, Indo-China, Japan, and even Turkestan, may be best judged by the density of population in the better-watered parts of these countries, and by the rapidly increasing amounts of grain exported, especially from India; while in Southern Siberia, the Altai, and the Middle Amur, Russian settlers raising wheat, rye, oats, barley, melons, &c. on the virgin soil of the prairies have enjoyed a welfare hardly known in Russia. In the raising of cotton India stands next to the United States, while Bokhara and Transcaucasia have supported about half of the cotton industry of Russia. Tea is a very important crop in India, Southern China, and Ceylon; and coffee is important in the Dutch Indies and in India. The silkworm culture is widely spread in Asia Minor, Persia, Turkestan, India, China, and Japan. The sugar-cane is largely raised in Southern and South-

eastern Asia. Oleaginous plants, indigo and other dye plants, jute, spices, the cinchona-tree, and opium-producing plants are extensively cultivated; as also fruit-trees in Western Asia and Turkestan. The coconut-palm, the bread-tree, gutta-percha, and plantation rubber are also grown to a great extent in tropical Asia; while many of our most valuable species of timber came originally from Asia, and are still imported thence to Europe.

On the steppes and plateaus of interior Asia, numberless herds of horses, horned cattle, and sheep furnish all the necessaries of life to the nomad or half-nomad Mongolian inhabitants of these regions, and supply the European trade with a large proportion of their hides, wool, and tallow. The forests of the far north and north-east afford the means of existence to nomad hunters, who find, however, severe competitors in the Siberian (Russian) peasants. Both supply the trade with rich furs; while the rivers of Siberia and Manchuria provide food for the nomad Ostiaks, Gols, and Ghilyaks. And finally, the Behring and Okhotsk Seas of the Northern Pacific, and their islands, supply the civilised world with some of the finest furs.

Ways of Communication. — The plateaus, the deserts, and the mountainous regions of Asia, thickly clothed with impenetrable forests and intersected by deep gorges and valleys, are so many obstacles to the communication between different parts of the continent. The roads of Asia, except those of China and India, and a few main lines elsewhere, are mostly mere footpaths or tracks marked in the deserts, with wells far apart, and bleached with the bones of camels. Caravans of camels are therefore the chief means of transport for goods and travellers in the interior; donkeys, yaks, and even goats and sheep are employed in crossing the high passages of the Himalayas; horses are the usual means of transport in many parts of China and Siberia, and in the barren tracts of the north the reindeer, and still farther north the dog, are made use of. Fortunately, the great rivers of Asia provide water communication over immense distances. The deep and broad streams of China, allowing heavy boats to penetrate far into the interior of the country, connect it with the sea; a brisk traffic is carried on along these arteries. In Siberia, the bifurcated rivers supply a water-way during summer not only north and south on their lower courses towards the Arctic Ocean, but also west and east on their upper courses; thus a great line of water communication crosses Siberia, and is, with but a few interruptions, continued in the east by the Amur, navigable for more than 2000 miles. In the winter the rivers and plains of Siberia become excellent roads for sledges, on which goods are still chiefly transported.

Railways have but lately begun to make their appearance in Asia; but in India they already have a total length of about 40,000 miles. Russia, too, has spread her railways right across Asia to the shores of the Pacific. The Trans-Siberian line, fed *viâ* Ekaterinburg from Petrograd and *viâ* Zlatoust from Moscow, connects by Kharbin with Vladivostok and Fusan (for Japan), and with Hankow and Shanghai, while Turkestan is linked up to Tula *viâ* Tashkent and Orenburg, and *viâ* Merv and the Caspian. The total distance from Petrograd to Peking by the Trans-Siberian Railway is about 6000 miles—i.e. less than that from London to Bombay *viâ* the Suez Canal. There are railways longer or shorter in Japan, Siam, &c., the Pilgrim Line from Aleppo to Medina *viâ* Damascus, and the 'Baghdad' Line, being specially important. All the chief ports in the south and south-east of Asia are in regular steam communication with Europe and the United States. The northern route from Europe to Siberia, by the Arctic Ocean and Kara Sea, is only practicable for a few weeks in the year.

Petrograd is connected by telegraph with Vladivostok, while another branch, crossing Turkestan and Mongolia, runs on to Tashkent, Peking, and Shanghai. Constantinople is connected with Bombay, Madras, Singapore, Saigon, Hong-Kong, and Nagasaki in Japan; Singapore stands in telegraphic communication with Java and Port Darwin in Australia; and Odessa is connected by wire with Tiflis in Caucasus, Teheran, and Bombay. Wireless stations have been established in many parts of Asia.

Trade.—Notwithstanding the difficulties of communication, a brisk trade is carried on between the different parts of Asia. India, China, and Japan are much the most important areas.

Hitherto Asia has supplied Europe chiefly with raw materials—gold, silver, petroleum, teak and a variety of other wood, furs, raw cotton, silk, wool, tallow, and so on; with the products of her tea, coffee, and spice plantations; and with a yearly increasing amount of wheat and other grain. Steam-industry in Asia already threatens to rival European manufacture. Indian cottons of European patterns and jute-stuffs compete with those of Lancashire and Dundee. Several of the petty trades carried on in India, China, Japan, Asia Minor, and some parts of Persia have been brought to so high a perfection that the silks, printed cottons, carpets, jewellery, and cutlery of particular districts far surpass in their artistic taste many like productions of Europe. Japan supplies Europe with thousands of small articles—applications of Japanese art and taste to objects of European household furniture.

Asia, CENTRAL. This term is often loosely applied to regions of greater or less extent in the interior of Asia, but geographers urge that the name should be strictly confined to the territory (Eastern Turkestan, Tibet, &c.) lying between the Altai Mountains on the north and the Himalayas on the south, the Pamir on the west and China Proper on the east. *Russian Central Asia* was a division of the empire outside that area—east of the Caspian Sea and round the Aral Sea and Lake Balkhash. It comprised, with part of what used to be called Siberia, Russian annexations in Turkestan. It was divided into the Steppes (provinces of Akmolinsk, Semipalatinsk, Turgai, Uralsk) and Turkestan (provinces of Semirechensk, Sir-Daria, Amu-Daria, Samarkand, Ferghana and Transcaspia; and the vassal states of Khiva and Bokhara). In 1920–21 the Moscow government set up the Kirghiz republic (the Steppes with part of Transcaspia and Astrakhan) and the Turkestan republic, as Russian federal states; and Khorezm (Khiva) and Bokhara became independent soviet republics in alliance with Russia. The redistribution of these territories is described at TURKESTAN. See also ASIA, SIBERIA, KHOKAND, &c.

Asiago, a town of north Italy, 22 miles N. of Vicenza, on a ridge, capital of the Sette Communi (see VICENZA). It fell into the hands of the Austrians, 30th May 1916, but was recovered by the Italians a few weeks later. Pop. (commune) 6500.

Asia Minor (Asia the Less, as distinguished from Asia in the widest extent) is the name usually given to the western peninsular projection of Asia, forming the main part of what was left of Turkey after the Great War. The name is not very ancient; originally the Greeks seem by Asia to have meant only the western part of Asia Minor around Ephesus, but with their geographical knowledge, the scope of the name Asia gradually widened. The late Greek name for Asia Minor is Anatolia (q.v.)—*Anatolē*, 'the East,' whence is formed the Turkish *Anadŏli*. The eastern boundary, somewhat artificial, is a line from the Gulf

of Skanderoon to the Upper Euphrates, and thence to a point east of Trebizond. The area of the peninsula exceeds 220,000 sq. m. It constitutes the western prolongation of the high tableland of Armenia, with its border mountain-ranges. The interior consists of a great plateau, or rather series of plateaus, rising in gradation from 3500 to 4000 feet, with bare steppes, salt plains, marshes and lakes; the structure is volcanic, and there are several conical mountains, one of which, the Erjias-dagh (Argæus), with two craters, attains a height of 13,000 feet, towering above the plain of Kaisarieh, which has itself an elevation of between 2000 and 3000 feet. The plateau is bordered on the north by a long train of parallel mountains, 4000 to 6000 feet high, and cut up into groups by cross valleys. These mountains sink abruptly down on their north side to a narrow strip of coast; their slopes towards the interior are gentler and bare of wood. Similar is the character of the border ranges on the south, the ancient Taurus, only that they are more continuous and higher, being to the north of the Bay of Skanderoon 10,000 to 12,000 feet, and farther to the west 8000 to 9000 feet. The west border is intersected by numerous valleys opening upon the Archipelago, to the northern part of which Mounts Ida and Olympus belong. Between the highlands and the sea lie the fertile coast-lands of the Levant. Of the rivers the largest is the Kizil Irmak (Halys), which, like the Yeshil Irmak (Iris) and the Sakaria (Sangarius), flows into the Black Sea; the Sarabat (Hermus) and Meinder (Mæander) flow into the Ægean. See ASIA.

The *climate* has on the whole a south-European character; but a distinction must be made of four regions. The central plateau, nearly destitute of wood and water, has a hot climate in summer, and a cold in winter; the south coast has mild winters and scorching summers; while on the coast of the Ægean there is the mildest of climates, with a magnificent vegetation. On the north side the climate is not so mild, but the vegetation is most luxuriant.

In point of natural history, Asia Minor forms the transition from the continental character of the East to the maritime character of the West. The forest-trees and cultivated plants of Europe are seen mingled with the forms characteristic of Persia and Syria. The central plateau, which is barren, has the character of an Asiatic steppe, more adapted for the flocks and herds of nomadic tribes than for agriculture; while the coasts, rich in all European products, fine fruits, olives, wine, and silk, have quite the character of the south of Europe, which on the warmer and drier south coast shades into that of Africa.

The inhabitants, some 10,000,000 in number, consist of the most various peoples. The Osmanli Turks, who number about 1,200,000, are spread over the whole country; allied to these are the Turkomans and Yuruks, speaking a dialect of the same language. The latter are found chiefly on the tableland, leading a nomadic life; there are also hordes of nomadic Kurds. Among the mountains east of Trebizond are the robber tribes of the Lazes.

The Greeks and Armenians were the most progressive elements in the population, and had most of the trade; while the Greeks monopolised the professions, the ownership of the land had largely passed into the hands of Greeks, Armenians, and Jews. During and after the World War, however, the Turks systematically massacred and expelled the Armenians and Greeks from Asia Minor. See ARMENIA, GREECE (*History*), TURKEY (*History*).

In ancient times the divisions were Pontus, Paphlagonia, Bithynia, in the north; Mysia, Lydia, Caria, in the west; Pisidia with Pamphylia, and Cappadocia, in the south; and Galatia with Lycaonia, and Phrygia, in the centre. Many of the Ægean islands belong geographically to Asia Minor.

Here, especially in Ionia, was the early seat of Greek civilisation, and here were the countries of Phrygia, Lycia, Caria, Paphlagonia, Bithynia, Lydia, Pamphylia, Isauria, Cilicia, Galatia, Cappadocia, &c., with Troy, Ephesus, Smyrna, and many other great and famous cities. Here, from the obscure era of Semiramis (about 2000 years B.C.) to the time of Osman (about 1300 A.D.), the greatest conquerors of the world contended for supremacy; and here took place the wars of the Medes and Persians with the Scythians; of the Greeks with the Persians; of the Romans with Mithradates and the Parthians; of the Arabs, Seljuks, Mongols, and Osmanli Turks with the Byzantine empire. Under the Turks the country sank into lamentable decay. Two railways start from Smyrna; the Anatolian railway runs from the Bosporus to Konïeh (640 miles); thence German financiers, in spite of political difficulties and national jealousies, perfected (from 1903) a scheme for continuing this line to Baghdad and the Persian Gulf—a scheme which Britain brought to it consummation.

See Kingslake's *Eōthen* (1844), and works by W. J. Hamilton (1840), Burnaby (1877), Mrs Stevenson (1881), Cochran (1887), Sir W. M. Ramsay (1890–1917), Hogarth (1896–1910), Hawley (1918); books cited at TURKEY and the map there.

Asiatic Society, ROYAL, was founded in London in 1823 for the investigation of arts, science, and literature in relation to Asia, and incorporated societies in Bombay, Madras, Ceylon, and Hongkong. The society publishes a valuable *Journal*, and has promoted many valuable books and translations. The Asiatic Society of Bengal had been founded in 1784. The Dutch Colonial Society in Java dates from 1779, the German Oriental Society from 1845, two French societies from 1821 and 1842 respectively, and the American one at Boston from 1842. Japan has a cognate society at Tokio.

Asinius. See POLLIO.

Asio. See OWL.

Asir, an Arabian imamate on the Red Sea, between Yemen and the Hejaz. A Turkish sanjak till 1914, then independent, it became in 1925–26 a vassal state of Nejd, with its territory reduced to a coast strip about Jizan and Abu Arish and the Farsan Islands.

Asirgarh, a strong fortress in the Nimar division of the Central Provinces, stands on an isolated mountain of the Satpura range, 850 feet above the base and 2283 above the sea. It was twice taken by the British—in 1803 and 1819.

Askabad, or 'ESHQ ĀBĀD (Poltaratsk), provisional capital of Turkmenistan, on the Trans-Caspian Railway, 350 miles SE. of Krasnovodsk. It was occupied by the Russians in 1881. Pop. 47,000.

Askalon. See ASCALON.

Aske, ROBERT. See PILGRIMAGE OF GRACE.

Aškerc, ANTON (1856–1912), Slovene poet, wrote ballads and romances.

Askew, ANNE, Protestant martyr, was born of gentle parentage near Grimsby, Lincolnshire, in 1521. Early embracing the views of the Reformers, she was turned out of doors by her husband, a zealous Roman Catholic. On this she went up to London to sue for a separation; but in 1545 she was arrested on a charge of heresy, and was examined by the Bishop of London and others on the doctrine of transubstantiation. After further examination and torture by the rack, she was burned at the stake, in Smithfield, July 18, 1546.

Askja (Ice., 'basket'), the largest volcano in Iceland, rises out of the vast Ódáthahraun lava-desert, near the centre of the eastern half of the island, in 65° N. lat. and 16° 45′ W. long. Its vast crater is over 23 sq. m. in area, and about 17 miles round. Almost circular, it lies at a depth of over 700 feet within a mountain built up, by a distinctly marked series of lava-flows, round a volcanic vent, to a height of 4633 feet above the sea. Great volumes of steam are belched forth from numerous rifts and vents, and the whole surface is a chaos of rugged lava-floods, except in the SE., where there is a hot-water lake 5 miles in circumference, and a tract covered with pumice ejected in 1875. This great eruption first called general attention to Askja, and it has been stated that the volcano was only then formed; but the traces of innumerable earlier eruptions are found in the walls of the crater, already referred to, where the divisions are marked by the layers of red, slag-like lava, which time after time has formed the surface of the underlying lava-strata. Most of the lava in this eruption found an outlet, not from the crater, but some miles to the NE., where a bed, 20 miles long and 7 broad, now lies.

Asklepios. See ÆSCULAPIUS.

Asmara, capital of Eritrea; pop. 13,500.

Asmode'us, or ASMO'DEUS (Heb. *Aschmedai*, 'the destroyer'), a demon mentioned in the later Jewish writings. In the book of Tobit he loves Sara, daughter of Raguel, and destroys in succession her seven husbands; hence, in modern times, he is jocularly spoken of as the destroying demon of matrimonial happiness. In the Talmud, Asmodeus is described as the prince of demons, and is said to have driven Solomon from his kingdom. His real origin may perhaps be traced to the *Aeshma daeva*, one of the evil demons of the ancient Persian religion. Le Sage has given him a permanent place in literature by his novel, *Le Diable Boiteux*.

Asmonæ'ans. See MACCABEES.

Asnières, a town and pleasure resort of France, in the department of Seine, on the left bank of the Seine, a NW. suburb of Paris; pop. (1926) 52,609.

Asnyk, ADAM (1838–97), Polish lyric and dramatic poet, author of the cycle of sonnets *Over the Depths*, and other philosophical poems.

Aso'ca (*Saraca indica*), an Indian tree of the Leguminosæ, sub-family Cæsalpinioideæ, remarkable for the beauty of its red and orange flowers. The leaves are abruptly pinnate, shining, and very beautiful. It is often mentioned in Indian poetry, and is connected also in various ways with Hindu mythology.

Asoka, an Indian king, has been called the 'Buddhist Constantine,' having organised Buddhism as the state religion. He was the grandson of Chandragupta or Sandrocottus (q.v.). He began to reign in 264 B.C. As king of Magadha or Behar, Asoka became a zealous convert to Buddhism about 257 B.C., and in 244 he convened the third of the great Buddhist councils at Patna. Throughout his kingdom and the conquered provinces he published the grand principles of the faith; and the fourteen edicts by which these sermons were preached are still found graven deep on pillars, caves, and rocks from Peshawar and Kathiawar to Orissa, in the Indo-Bactrian character (see ALPHABET). His civil organisation and administration of justice were also admirable. He died about 223 B.C. See Vincent A. Smith, *Asoka, the Buddhist Emperor* (1901; rewr. and enl. 1921); Rhys Davids, *Buddhist India* (1903); BUDDHISM, and INDIA.

As'olo, an ancient walled and turreted city of Venetia, commanding from the hills a noble view over the plains to Venice, 35 miles to the SE.; it has memories of Caterina Cornaro, queen of Cyprus, of Canova, and of Robert Browning, who celebrates the place in his *Asolando*. Pop. 1000.

Asp (Gr. *Aspis*), a name loosely applied (1) to the *Vipera Aspis* of Southern Europe, and other species of Vipera. (2) Cleopatra's asp to which allusion is so often made, was most probably the small *Vipera hasselquistii* or horned viper. (3) It is equally impossible and unnecessary to determine with certainty the exact significance of the biblical word 'asp.' Several species of vipers occur in Palestine, but the context would in some cases suggest the Egyptian juggler's snake, *Naja haje*. (4) Another form, which is nearly allied to the Indian cobra da capello (*Naja tripudians*), is, like the latter, very venomous, and has also the habit of dilating the loose skin of its neck. It has been long known, and seems to be often referred to under the titles *aspis*, aspic, and asp.

Aspar'agine, $C_2H_3NH_2\left\{\begin{matrix}CONH_2\\COOH\end{matrix}\right.+2H_2O$, is a crystalline substance which exists ready formed in common asparagus, marsh-mallow, potatoes, chestnuts, liquorice-root, and the young shoots of peas, beans, &c. It is readily obtained from the expressed juice of the young shoots of asparagus, which, after filtration and evaporation to a syrup, soon deposits it in crystalline prisms of a right rhombic form. These crystals dissolve freely in boiling water, the cooled solution having a mawkish and cooling taste, and a slight acid reaction. From a chemical point of view, asparagine is regarded as the Amide (q.v.) of aspartic acid, and forms compounds with acids and alkalies.

Asparagus, a genus of Liliaceæ; it contains sixty to seventy species, usually herbaceous, but sometimes shrubby or climbing; the stem is unarmed in some, in others thorny; the young shoots covered with leaf-scales, afterwards very much branched, with numerous fasciculate,. generally bristle-like 'leaves,' which are really abortive branches or flower-stalks, the true leaves being

Asparagus:
a, upper end of a stem, showing leaves, &c.; *b*, young shoot.

reduced to minute scales. The most widely diffused species is the Common Asparagus (*A. officinalis*), a native of Europe, which grows on the banks of rivers and on the sea-shore, in meadows and bushy places, especially in sandy soils, occurring wild in a few places in Britain, and which is also in general cultivation as a garden vegetable; its young shoots, when they first sprout from the

earth, form a much esteemed article of food, which, however, is only in a slight degree nutritious. These sprouts contain a peculiar crystalline substance, called *Asparagine*, and have a specific action on the urinary organs, so that their long-continued use in very large quantities is apt even to produce bloody urine. They are no longer retained in the pharmacopœia. By cultivation asparagus is much increased in size, and considerably altered in general appearance. In its wild state it is seldom more than a foot high, and not much thicker than a goose-quill; whereas it can be obtained in gardens more than half an inch in diameter, while its stems may rise to the height of four or five feet. Asparagus was a favourite vegetable of the ancient Romans. It is raised from seed, and grows best in a rich, fresh, sandy soil. The seed is generally sown in spring, either in the prepared bed, or in drills, from which the shoots may be transplanted when one year old. In England, it is generally planted in rows, at distances varying from 1 foot to 2½ feet, in beds that have been previously prepared by deep trenching (usually 2½ to 3 feet) and rich manuring. The shoots should not be cut till the second year after planting, and then very sparingly at first. Litter or vegetable mould is spread over the bed in autumn. It is allowed to occupy the same ground for many years; well-made beds continuing in a good bearing condition for twenty years or more. Asparagus is grown more extensively in France, where large quantities are raised among the vines. The French method differs chiefly in the substitution of more surface manuring for the English practice of preparing and enriching the bottoms of the beds.—The seeds have been used as a substitute for coffee, and a kind of spirit has been made from the fermented berries. The young shoots of several other species are also eaten, as those of *A. tenuifolius*, *A. acutifolius*, and *A. albus*, natives of the south of Europe; the last of which is used in Spain and Portugal as a salad, in soups, and as a boiled vegetable. On the other hand, the sprouts of the Bitter Asparagus (*A. scaber*), which is very similar to the Common Asparagus, are uneatable for bitterness. See C. Ilott, *The Book of the Asparagus* (1899).

Asparagus Stone. See APATITE.

Aspa'sia, one of the most remarkable women of antiquity, was born at Miletus. The circumstance that in Athens marriage with foreign women was illegal, has originated the erroneous notion that Aspasia was a courtesan. She certainly broke through the restraint which confined Athenian matrons to the seclusion of their own homes; for after her union with Pericles, who had parted from his first wife by mutual consent, her house became the rendezvous of all the learned and distinguished people in Athens. Socrates often visited her. Her beauty, varied accomplishments, and political insight were extraordinarily great. From the comic writers and others she received much injustice. Hermippus, the comic poet, took advantage of a temporary irritation of the Athenians against Pericles, to accuse Aspasia of impiety; but the eloquence of the great statesman procured her acquittal. Her influence over Pericles must have been singularly great, and was often caricatured—Aristophanes ascribing to her both the Samian and the Peloponnesian war, the latter on account of the robbery of a favourite maid of hers. Plutarch vindicates her against such accusations. Her son by Pericles was allowed to assume his father's name. After the death of Pericles (429 B.C.), Aspasia is supposed to have formed a union with Lysicles, a wealthy cattle-dealer, who became an eminent man in Athens.

Aspatria, a township and urban district of Cumberland, 20 miles SW. of Carlisle, having an agricultural college; pop. 3500.

Aspe, a valley (once a republic) in the Western Pyrenees, close to the Spanish frontier.—ASPE is also a Spanish town, 20 miles W. of Alicante, with a trade in fruit and wine; pop. 7600.

Aspects, in Astronomy, are certain positions of planets with respect to one another, as seen from the earth. In the days of astrology, there were five Aspects—Conjunction (indicated by the symbol ☌), Sextile (⚹), Quartile (□), Trine (△), Opposition (☍). Two planets are in conjunction when they have the same longitude; the aspect is sextile when they are 60° apart; quartile, when the distance is 90°; trine, when it is 120°; and at 180° they are opposite to one another, or in opposition. Astrology ascribed to these aspects great influence over the fate of individuals and of nations. The only two of the terms now in use are *conjunction* and *opposition*. These, the former especially, were often not reckoned as aspects.

Aspen, or TREMBLING POPLAR (*Populus tremula*; see POPLAR), a tree which grows plentifully in Europe and in Siberia. It is a native of Britain, and is frequently found in Scotland, where it is met with even at an elevation of 1500 feet above the sea. It has received the specific name *tremula*, from the readiness with which its leaves are thrown into a tremulous motion by the slightest breath of wind—a property for which, indeed, the aspen-leaf has become proverbial. The leaves are

Branch of Aspen (*Populus tremula*): *a*, catkin.

nearly orbicular, but broadly toothed, so as almost to exhibit angles. The footstalks are long, slender, and compressed, which favours the readiness of motion. It grows quickly, with a straight stem, reaching to a height of from 60 to 80, or even 100 feet. The wood is soft, porous, light, white, and smooth; it does not make good fuel, but is very fit for the turning-lathe, and especially for being made into troughs, trays, and pails; whilst in France it is used for sabots. If the stem be peeled and allowed to dry before it be cut down, the wood becomes harder, and is then capable of being used as timber for the interior of houses; and on this account the tree is of great importance in many districts, and the more so as it succeeds in any soil, although it prefers one which is moist and gravelly. The bark contains a great quantity of a bitter alkaloid, *Salicin*. The charcoal made from this tree used to be extensively used for gunpowder. The peculiar quivering of the leaves of the aspen has given origin to a wealth of legendary and literary associations with the tree. The old legend that it supplied the wood of the Cross, and has never since ceased to tremble, is even yet quoted as the cause of its ceaseless quivering. It appears to have been highly valued as a timber tree in the time of Henry V., particularly for the making of

arrows. An act of parliament was passed in that reign preventing the consumption of the *aspe* for any other purpose, under a penalty of a hundred shillings. This act was only repealed in the reign of James I. Other common trees belonging to the Aspen tribe of Poplars are the White Poplar (*P. alba*) and its variety the Gray Poplar (*P. alba*, var. *canescens*), both of which were introduced into Britain from the continent of Europe.

Aspergil'lum, a remarkable genus of boring Lamellibranch Molluscs, in which the shell has the form of an elongated cone, terminating at the lower end in a disc, pierced by numerous small tubular holes. The appearance of the disc suggests the rose of a watering-pan, and this has given rise to the popular ('Watering-pot') and technical names. The tube itself is secreted by the siphons through which the water passes in and out. The two minute valves of the young mollusc persist near the lower end of the tube. Similar rudimentary shells are exhibited by allied genera, in the family *Gastrochænidæ*, and by the fossil *Teredina*, which bored the drift-wood of the London clay.

Aspergillum: *a*, the disc with holes; *b*, the rudimentary valves.

Aspergillus is the name of a genus of minute fungi or Moulds (q.v.) occurring on decaying substances of various kinds. Aspergillus and Aspergillum are both late Latin words (from *aspergere*, 'to sprinkle') for the brush used in the Roman Catholic Church for sprinkling holy water on the people.

Aspern, a small village of Austria, on the left bank of the Danube, nearly opposite Vienna. It was the scene of a sanguinary battle on 21st and 22d May 1809, between the French under Napoleon and the Austrians under Archduke Charles, the French being defeated, after terrible slaughter, on the second day. The loss of the Austrians was 24,000; of the French, 30,000.

Asper'ula. See WOODRUFF.

Asphalt, ASPHALTUM, or MINERAL PITCH, is the name given to a compact form of bitumen, which is usually black or dark-brown in colour. When free from earthy impurities, it has a conchoidal fracture and resinous lustre. Asphalt is generally found wherever rock-oil occurs, and in such localities it is clearly produced by the drying up of the petroleum. In some places, however, it occurs in beds forming a compact rock. The Dead Sea, the district near Babylon, some of the West Indian Islands, notably the *Pitch Lake* in Trinidad, and one or two places in Venezuela, France, Switzerland, Hanover, and Dalmatia, are the best-known localities for this substance; but it is found, more or less, in many countries. Asphalt was employed by the ancient Egyptians for embalming their dead, and it was used in Babylon as mortar. Its modern applications are numerous. It is an ingredient in Japan varnish, and is used along with other materials to make waterproof roofing and flooring, linings for cisterns, and along with pasteboard material in the construction of water-pipes. It is much used to form what are called 'damp courses' in walls of buildings—that is, a layer of it, from ½ inch to ¾ inch thick, is spread over the thickness of a wall near the ground-level, to prevent the ascent of damp. Frequently nowadays the whole internal area of a house is covered with a layer of asphalt. In cases where the wall of a house comes against a bank of earth, the whole surface is protected from damp by a lining of this material. One or two kinds, such as those found at Seyssel in the east of France, and at Val-de-Travers in Switzerland, though called asphalts, are really bituminous limestones. The latter is known all over the world as a material for pavement. This Val-de-Travers asphalt is prepared by reducing the natural rock, which contains from 7 to 20 per cent. of bitumen, to powder, and then putting it with a small quantity of melted bitumen into a caldron. After it is fused and stirred for some time, it is run into moulds to form blocks of about 1 cwt. each. These blocks are called 'asphaltic mastic,' and the finest kinds contain 87 per cent. of carbonate of lime and 13 of bitumen. This mastic should not melt below 168° F. It has, especially since 1854, been very extensively employed in making roads and pavements. When this material is used, there is, of course, far less noise produced by the traffic on the streets than with stone. For paving purposes, the 'asphaltic mastic' is heated in portable boilers, into which, at a certain stage of the preparation, there is poured about 25 per cent. of thoroughly dried sand, gravel, or powdered limestone, which is well mixed with the liquid asphalt. The mixture is then spread on the spot prepared for it, and when cool forms a hard kind of pavement. Asphalt pavements are also formed by spreading the compound in powder, and solidifying it by beating with a hot rammer. Such a roadway is very durable and dustless. Pavements formed of an artificial or coal-tar asphalt have long been, to a limited extent, in use; but this material is not so suitable for the purpose as the natural asphalts. It is well to state, however, that artificial asphalt is more used for 'damp courses' than the asphalts from bituminous limestones, although the latter are much better. Of late years, an asphalt made of coal-tar pitch and a cheap mineral oil called creosote oil, has been much used for the joints of wood-pavement and causeway stones, and does very well. See PAVEMENT, ROADS. The pigment known as asphaltum is sometimes prepared from natural asphalt, but more frequently from the residue of distilled bituminous substances. Unfortunately, its fine transparent brown colour tempted some distinguished modern artists to use it largely. As prepared it did not dry, but flowed, forming great surface cracks, and thereby innumerable pictures have been ruined. When the volatile constituents of asphaltum are driven off by a heat of 250° C. the pigment can be safely used. See also BITUMEN.

As'phodel (*Asphodelus*), a genus of perennial herbs belonging to the family Liliaceæ. The roots are fleshy and fasciculated, the leaves linear, and the flowers are arranged in long racemes, often compound, and continue flowering during great part of winter and early spring in their native country, covering, for instance, the bleakest hillsides in Greece. It is associated in Greek mythology, and thence throughout poetry, with the Elysian fields. The species are not numerous, and are mostly natives of the countries around the Mediterranean Sea. *A. albus* ranges as far north as Monte Generoso in Switzerland. *A. ramosus* is now recognised as the plant called chara in Cæsar's *Bellum Civile*, which nourished his famine-stricken army in Epirus when the hostile fleet had cut off supplies. The root can only be rendered eatable after prolonged boiling, and it is utilised even in our times by the frugal Albanian peasants when no better food is to be had. Griffith speaks of the camp-followers in the Afghan campaign of 1839 eating asphodel. The Yellow Asphodel or King's Spear (*A. luteus*) and the White Asphodel (*A. albus*) have long been known in Britain as garden-

flowers. The former has an unbranched stem 2–3 feet high, much covered by the sheathing bases of the long narrow leaves. The leaves of the latter

White Asphodel (*Asphodelus albus*).

are all radical, the flowers in branched clusters. See also Bog Asphodel, Daffodil, Narcissus.

Asphyx'ia (Gr.), literally 'pulselessness,' but usually applied to the condition resulting from the blood in the body no longer being brought into the proper relations to the atmospheric air by respiration, so as to allow a sufficiently free exchange of carbonic acid for oxygen (see Respiration). Asphyxia, or suspended respiration, may result from several causes. No air, or but a scanty supply, may be admitted, as in strangulation, drowning, choking, or disease in the windpipe; the chest may be prevented from expanding either from a superincumbent weight or paralysis, as when a man breaks the upper part of his neck above the phrenic nerve, thus paralysing the diaphragm; and again, although there may be every capacity for respiration, the air itself may be in fault, and contain too little oxygen or too much carbonic acid in proportion to other elements. Aquatic animals may be asphyxiated either by depriving the water they inhabit of oxygen, or impregnating it with excess of carbonic acid.

When from any of the above causes asphyxia occurs, the respiratory movements become quicker and more forcible than normal, and additional muscles are brought into action till the respiratory acts merge in general convulsions. Meanwhile consciousness has been lost; the blood, unable to circulate freely through the lungs in consequence of its imperfect oxygenation, accumulates in them, in the right side of the heart, and in the veins, and the skin becomes livid. The short convulsive stage is followed by one of comparative quiescence, in which respiratory efforts more natural in appearance are made, but become slower and weaker till they stop altogether. The heart continues to beat feebly for a short time after all other movements have ceased.

After death the blood is very dark in colour. It remains fluid, or nearly so, and consequently gravitates very readily to the part of the body which happens to be most dependent. The right side of the heart is found distended with fluid blood, the left nearly empty. The lungs are usually, though not always, much congested.

In man death occurs in from a minute and a half to five minutes after complete deprivation of oxygen. Some persons, no doubt, as the Ceylon divers, can by habit do without a fresh supply of air for a longer period; and some diving animals have an arrangement of blood-vessels by which they are enabled to be under water for a long time. Restoration of asphyxiated persons may be attempted with hopes of success at a very long period after apparent death. The object of all methods is of course to fill the lungs with fresh air. For a description of these, see Respiration (*Artificial*).

Asphyx'iants, chemical substances enclosed in shells or other projectiles, which act by producing a suffocating and poisonous effect. The French in 1851 made experiments with asphyxiating shot for naval purposes, designed to suffocate the crews between decks. Such missiles were disapproved by the Peace Conference at The Hague in 1899 (Britain and the United States dissenting). Nevertheless they were used in the Great War by Germany and the other belligerents. The Washington Conference again condemned them (1922). A similar device, the stinkpot, has been used in warfare amongst the Chinese and the pirates of the eastern seas.—In a more general sense coal-gas escaping in a house, the carbonic acid gas filling wine-vats, or liberated in coal-pits after an explosion of fire-damp, and the various products of combustion, are all asphyxiants which daily claim their victims. In manufactories, numerous instances occur of workmen venturing incautiously into tanks containing the vapours of chloroform, alcohol, aniline, petroleum, and other liquids, all of which act as asphyxiants. A striking case of asphyxiation occurred on 25th September 1886, at Crarae quarry, Loch Fyne, where seven tons of gunpowder were exploded in order to shatter an immense face of rock. A large party of excursionists, who had witnessed the grand explosion from a steamer, landed shortly afterwards, and entered the quarry. Without any warning, about forty of them were suddenly struck down by the poisonous suffocating vapours, and although soon removed to fresh air, seven of them never rallied. —There are many devices in use for extinguishing fires by means of a portable apparatus which produces an asphyxiating gas, such as carbonic acid gas. Fire-extinguishers of this kind are called asphyxiators.

Aspic (Fr.), a savoury meat-jelly, containing fish, game, hard-boiled eggs, &c.

Aspid'ium. See Fern (Male).

Aspinwall, or Colón, a town of Panamá (q.v.), virtually, however, a colony of the United States. It is situated on the island of Manzanilla in Limon Bay, 8 miles NE. of the old Spanish port of Chagres, 47 miles NNW. of Panamá by rail, and equidistant from the great trading centres of Valparaiso and San Francisco. It forms the Atlantic extremity of the Panamá Railway (1849–55) and of the Panamá Canal (see Panamá). Population, about 32,000, mostly blacks. From its commanding position as a place of transit, Aspinwall benefits by the traffic in both directions. The climate, formerly very unhealthy, has been greatly improved

by the sanitary measures for the canal zone under United States auspices. The town was presented with a statue of Columbus, after whom it is officially named Colón, from the Spanish form of the name of Columbus. The name Aspinwall it derives from a New York merchant (William H. Aspinwall, 1807–75), the originator of the Panamá Railway; the company having founded the town in 1850.

Asp'irate, the sound represented by the letter *h*, as a mere *breathing*. The name aspirate is also applied to two classes of consonants.

Aspirator is an apparatus employed to draw air or other gases through bottles or other vessels. It is of great use in the examination of gases by the analytical chemist. The simplest form of the apparatus is a large vessel capable of being filled with water, having a tube with stopcock at the bottom, and a second tube with stopcock at the top. In working, the apparatus is filled with water; the tube at the top is attached to the vessels through which the gas is to be drawn; and both stopcocks being opened, the weight of the water escaping at the bottom draws in the gas through the tube at the top from the attached bottle or other vessel. The name is also given to a surgical instrument for removing fluids from the body cavities (in pleurisy, abscesses, urinary troubles) by means of a partial vacuum.

Asplenium. See FERNS.

Aspromonte, a rugged, wooded mountain in the SW. corner of Italy, near Reggio, forming the extremity of the Southern Apennines, and overlooking the Strait of Messina. The summit, Montalto (6907 feet), commands a glorious view. Here in 1862 Garibaldi (q.v.) was defeated and captured.

Aspropot'amo. See ACHELOUS.

Asquith, HERBERT HENRY, 1ST EARL OF OXFORD AND ASQUITH (1925), born at Morley, Yorkshire, 12th September 1852, was educated first at the Moravian school of Fulneck, near Bradford, and from the City of London School passed to Balliol College, Oxford, where he took a first class in classics (1874), won the Craven and gained a fellowship. Called to the bar at Lincoln's Inn in 1876, he became a Q.C. in 1890; in 1886 entered parliament as a Gladstonian for the East division of Fife, and from 1892 to 1895 was Home Secretary; and in 1905–8 he was Chancellor of the Exchequer, and strenuously combated 'tariff reform.' On the resignation of Sir H. Campbell-Bannerman, he formed a ministry in which he was Prime-minister and First Lord of the Treasury. His Chancellor of the Exchequer, Mr Lloyd George, in the budget of 1909 aimed at producing an expanding revenue by duties on land values (on increment value, undeveloped land, mineral rights), increased excise duties and liquor licences, changes in income-tax, death duties, and stamps. Some provision was made for industrial development and road improvement, and what its supporters regarded as social reform was denounced by opponents as socialism. The budget passed the Commons, but was thrown out by the Lords. The General Election at the beginning of 1910 gave the government a (reduced) majority; the budget was reintroduced and passed by both Houses; and the Prime-minister introduced measures for limiting the veto of the House of Lords. The Lords should not have any power over money bills (the Speaker to decide absolutely which were money bills); and any bill three times passed in the Commons should become law, irrespective of the opposition of the Lords, when two years had elapsed after its first introduction. The death of King Edward VII. (May 1910) compelled a temporary delay, but in August the Parliament Act received the royal assent from George V. A measure for the payment of members was passed. The government steadily opposed the referendum even on such subjects as Tariff Reform and Home Rule. A dissolution of parliament took place in November 1910, but the General Election of December 1910 left the strength of parties practically unaltered. The great measure of 1911 was National Insurance, and the government had to face a great railway strike. In 1911 the alarming colliers' strike led to the passing of a Minimum Wages Act. For his opposition to women's franchise, Mr Asquith was much persecuted by 'militant Suffragettes.' Home Rule and Welsh Disestablishment Acts were passed, but their coming into operation was postponed on account of Britain's entry upon the Great European War. Mr Asquith himself became War Secretary. He formed a Coalition Cabinet in 1915, but was ousted from office by Mr Lloyd George next year, and at the General Election of 1918 lost his seat (East Fife). In 1920 he returned to the House as member for Paisley, and led the Independent Liberals, and later the superficially united party. In 1924 Paisley fell to the Labour candidate, and Mr Asquith soon after accepted an earldom. Party dissentions broke out afresh in 1926, and a few weeks later Lord Oxford resigned the leadership. He died 15th February 1928. His second wife, Emma Alice Margaret ('Margot'), daughter of Sir Charles Tennant, wrote a vivacious and audacious *Autobiography* (1920–22), *Places and Persons* (1925), &c. His second son (by his first marriage), Herbert Asquith, born in 1881, made a name as a poet; his younger daughter, Princess Elizabeth Bibesco, as a writer of lively novels.

Ass, an animal differing from the Horse (q.v.) in having short hair at the root of the tail and a long tuft at the end, in the absence of warts on the hind-legs, and in the persistence of stripes, except in albinos. The upright mane, the long ears, the cross stripe on the shoulders, and the dark bands on the back are also characteristic. Its domestication took place at an early date, probably before that of the horse, from a type like the present Abyssinian ass (*Equus asinus*), and apparently in Asia; but the donkey has been common in England only since Queen Elizabeth's time. In Arabia, Syria, Egypt, Spain, Kentucky, and elsewhere asses are well cared for, and the breed has been considerably varied and improved. The stupidity for which the animal has for long been proverbially reproached seems largely the result of human influence. The male ass is capable of procreation at two years old; the female carries her foal twelve months. The *mule* is a hybrid bred between mare and male ass; while the *hinny* is the rarer result of hybridism between horse and female ass. The mule is much nearer in temper and appearance to the ass than to the horse; the hinny in some points resembles the horse more, as it neighs, while the mule brays like the ass. The ass is admirably adapted for a beast of burden, being remarkable for endurance, hardiness, and docility under kind treatment. The peculiar pace, the quaint intelligence, often superior in spite of ill-usage to that of the horse, curious traits of character such as the aversion to cross water, which is probably an unconscious recollection of ancestral nomadic life, the longevity and general hardiness, are familiar.

The wild asses, handsomer than the domestic, have shorter ears, and longer, finer limbs. The shy, swift *E. onager* occurs in herds in the Asiatic deserts, migrating southwards in winter. The large, handsome *E. hemionus*, with dark stripes on its back, inhabits high plateaus from Tibet to Mongolia. See DZIGGETAI; also ZEBRA and QUAGGA.

The wild ass is hunted in the East—e.g. in Persia; and the flesh is much esteemed. The milk of the ass is more sugary and less cheesy than that of the cow, and is on that account recommended

to some invalids—e.g. consumptives. The leather called Shagreen (q.v.) is made from the skin, which is also utilised for shoes and drums. The

The Wild Ass.

ancients are said to have used the bones for making flutes. From early times, white (albino) asses were reserved for the use of the honoured. See Darwin's *Animals and Plants under Domestication;* and the article DOMESTICATION.

Assab, a port, bay, and province of Eritrea, on the west coast of the Red Sea, 40 miles NW. of the Strait of Bab-el-Mandeb. The district around Assab Bay, with an area of 243 sq. m., was sold in 1870 by some Danakil chieftains to an Italian steamship company for a coaling station on the road to India. In 1880 it was taken over by the Italian government.

Assagai. See ASSEGAI.

Assai, a creamy, purplish beverage used on the Amazon, made from the fruit of Euterpe palms.

Assal', a large salt-lake in French Somaliland, nearly 9 miles from the coast of the Bay of Tajura. It is nearly 600 feet below the level of the sea. Abyssinian caravans resort to Assal for the purpose of carrying off the salt, which is thickly encrusted on its shores.

Assam', in the NE. extremity of British India, was in 1874 formed into a separate administration under a chief-commissioner; and in 1905, on the division of Bengal, was united with Eastern Bengal to make a new province. It was again formed into a separate province in 1912. By the Government of India Act (1919) it became a 'governor's province.' It is represented in the Council of State by one member, in the Legislative Assembly by four. The Provincial Legislative Council has thirty-nine elected and fourteen nominated members. The country, which borders on Bengal, Burma, Tibet, and Bhutan, is mainly in the valley of the Brahmaputra, which cuts the Himalayas at the base of Namcha Barwa (25,445 feet). The valley is bounded on both sides by mountainous territory, including the Garo, Khasi, and Jaintia Hills. Minor streams are abundant. The annual rainfall is in some parts (as the Khasi Hills) the heaviest in the world, except perhaps a spot in Hawaii. The low-lying regions suffer from inundations. Earthquakes are not infrequent. The soil is fertile, but much of the land is under jungle, which produces valuable timber, and shelters elephants, rhinoceroses, tigers, leopards, bears, and buffaloes. Coal and petroleum are largely produced, and there is plenty of limestone and iron. Rice is the main crop; tea is also very important; and besides rice and tea, cotton, silk, jute, mustard-seed, rubber, ivory, and gold are exported. The commerce is largely in the hands of Jains; but the tea-gardens, which developed enormously in the last quarter of the 19th century, are mostly owned and managed by Europeans, the labourers being mainly coolies from other parts of India. Of the total area of 61,500 sq. m., 53,000 are British, the rest being under the Maharaja of Manipur (q.v.) and minor native chiefs. To snakes and tigers are attributed many deaths annually, both amongst men and cattle.

In 1826, at the close of the first Burmese war, Assam was ceded to the British, but the upper portion was conferred on the native raja, whom the Burmese had expelled; in 1838, because of his misgovernment, the entire country was placed under British administration. The only towns of any size are Shillong (the capital), Sylhet, Gauhátí, and Sebságar. A majority of the people are Hindus in faith; but 27 per cent. are Mohammedans, and 17 per cent. are aboriginal heathens. The principal native races are of the Shan stock (see BURMA); they are short and robust in person, with flat faces, high cheek-bones, and coarse black hair. In most of the tribes the native Mongolian has been largely mixed with Hindu blood, so that in some the Hindu type is predominant. Besides the Assamese, whose language is akin to Hindi and Bengali, there are in the hills tribes of Lushai stock. The total population increased from under 5,000,000 in 1881 to nearly 8,000,000 in 1921 (including some 384,000 in Manipur). See the series of monographs published by the Assam government, including *The Garos,* by Major Playfair (1910), and *The Nagas,* by T. C. Hodson (1911); histories of Upper Assam by L. W. Shakespear (1914), Sir E. Gait (1926).

Assandun. See ASHINGDON.

Assassination, the act of taking the life of any one by surprise or treacherous violence, either by a hired emissary, by one devoted to the deed, or by one who has taken the task upon himself. Generally, the term is applied to the murder of a public personage by one who aims solely at the death of his victim. In ancient times assassination was not unknown, and was often even applauded, as in the scriptural instances of Ehud and Jael, and in the murder of Hipparchus by Harmodius (q.v.) and Aristogeiton; but assassination by enthusiasts and men devoted to an idea first becomes really prominent in the religious struggles of the 16th and 17th centuries. To this class belong the plots against the life of Queen Elizabeth; while the horrible succession of assassinations of Roman emperors is simply a series of murders prompted by self-interest or revenge. Omitting these last, which are noted elsewhere, the following list includes the most important assassinations, arranged in chronological order. With one or two exceptions, fuller accounts of the persons mentioned will be found under their particular headings.

Julius Cæsar	Mar. 15,	B.C.	44
Thomas Becket	Dec. 29,	A.D.	1170
Albert I., German Emperor	May 1,		1308
James I. of Scotland	Feb. 21,		1437
Alessandro de' Medici	Jan. 5,		1537
Cardinal Beaton	May 29,		1546
David Rizzio	Mar. 9,		1566
Lord Darnley	Feb. 10,		1567
James, Earl of Moray, Regent	Jan. 23,		1570
William of Orange	July 10,		1584
Henry III. of France, by Jacques Clément	Aug. 1–2,		1589
Henry IV. of France, by Ravaillac	May 14,		1610
Villiers, Duke of Buckingham, by Felton	Aug. 23,		1628
Wallenstein	Feb. 25,		1634
Archbishop Sharp	May 3,		1679
Gustavus III. of Sweden	Mar. 16; died Mar. 29,		1792

Marat, by Charlotte Corday	July	13,	1793
General Kléber, at Cairo	June	14,	1800
Paul, Tsar of Russia	Mar.	24,	1801
Spencer Perceval, premier, by Bellingham	May	11,	1812
Kotzebue, the dramatist	Mar.	23,	1819
Duc de Berri	Feb.	13,	1820
Charles III., Duke of Parma	Mar. 26; died Mar.	27,	1854
Abraham Lincoln, by Booth	April 14; died April	15,	1865
Michael, Prince of Serbia	June	10,	1868
Marshal Prim	Dec. 28; died Dec.	30,	1870
Georges Darboy, Archbishop of Paris, by communards	May	24,	1871
Earl of Mayo, governor-general of India	Feb.	8,	1872
Sultan Abdul-Aziz	June	4,	1876
Alexander II., Tsar of Russia	Mar.	13,	1881
President Garfield	July 2; died Sept.	19,	1881
Lord Frederick Cavendish and Mr Burke	May	6,	1882
President Carnot, by an anarchist	June	24,	1894
Stambuloff	July 15; died July	18,	1895
Empress of Austria	Sept.	10,	1898
Humbert, King of Italy	July	29,	1900
President McKinley	Sept. 6; died Sept.	14,	1901
King and Queen of Serbia	July	11,	1903
Grand-duke Sergius of Russia	Feb.	17,	1905
King and Crown Prince of Portugal	Feb.	1,	1908
Stolypin	Sept. 14; died Sept.	18,	1911
George, King of Greece	Mar.	18,	1913
Archduke Franz Ferdinand and his wife	June	28,	1914
Jaurès	July	31,	1914
Count Stuergkh, Austrian premier, by Fritz Adler	Oct.	21,	1916
Count Tisza, Hungarian premier	Oct.	30,	1918
President Paes of Portugal	Dec.	14,	1918
Karl Liebknecht and Rosa Luxemburg	Jan.	15,	1919
President Eisner of Bavaria	Feb.	21,	1919
Walther Rathenau	June	24,	1922
Michael Collins	Aug.	22,	1922
President Narutowicz of Poland	Dec.	16,	1922

The *Assassination Plot* was a conspiracy by Jacobites to murder William III. (q.v.) in 1696—he was to have been assassinated at Turnham Green on his return from a hunting-party; but one of the forty conspirators sent word to the king. See also ANARCHISM, DYNAMITE, NIHILISM, POLITICAL OFFENCES, THUGS.

Assassins, a fanatical branch of the secret Moslem sect of the Ismailis (q.v.). The esoteric doctrines of the latter taught that all actions were morally indifferent; and the atrocious career of the Assassins was but a natural sequence of such teaching. The founder of this body, Hassan-ibn-Sabbah, a Shîite of Khorassan, had, about the middle of the 11th century, studied at Nishapur, and had subsequently obtained from Ismaili *dais*, or religious leaders, a partial insight into their secret doctrines, and a partial consecration to the rank of *dai*. But at Cairo he quarrelled with the heads of the sect, and was forced to quit Egypt, and return by Aleppo and Damascus to Persia. Here he gradually gathered followers, and in 1090 he conquered the rock-fortress of Alamut, in Persia, founding there a famous society, resembling the Ismailis in speculative doctrines, but marked by one peculiar feature—the employment of secret assassination against all enemies. The internal constitution of the order was as follows: First, as supreme and absolute ruler, came the *Sheikh-al-jebal*, the 'Old Man of the Mountains.' Then came his three vicegerents, the *Dai-al-kirbal*, or grand-priors of the order; thirdly, the *Dais*, or priors; and fourthly, *Refiks*, associates, which last were not initiated, like the former, into all the secret doctrines. To the uninitiated belonged first of all the *Fedavis* or *Fedais* ('the devoted'), a band of resolute youths, the ever-ready and blindly obedient executioners of the Old Man of the Mountains. Before he assigned to them their bloody tasks he used to have them thrown into a state of ecstasy by the intoxicating influence of the *hashish* (the hemp plant), which circumstance led to the order being called *Hashishin* ('hemp-eaters'). The word was changed by Europeans into *Assassins*, and transplanted into the languages of the West with the signification of 'murderers.' The *Lasiks*, or novices, formed the sixth division of the order, and the labourers and mechanics the seventh. Upon these the most rigid observance of the Korân was enjoined; while the initiated, on the contrary, looked upon all positive religion as of no importance. This powerful and unscrupulous sect soon inspired widespread terror. Hassan died in 1124, leaving as his successor his chief *dai*, Kia-Busurg-Omid. Under him the Assassins established a stronghold in Syria, and proved their power by the murder of two successive khalifs. In 1163 Hassan II. was rash enough to extend the secret privilege of the initiated—exemption, namely, from the positive precepts of religion—to the people generally, and to abolish Islamism in the Assassin state, which led to his falling a victim to his brother-in-law's dagger. Under the rule of his son, Mohammed II., who acted in his father's spirit, the Syrian *Dai-al-kirbal* Sinan became independent, and entered into abortive negotiations with the Crusaders. It was his emissaries who killed Count Raymond of Tripoli and Conrad of Montferrat. Mohammed was poisoned by his son, Hassan III., who reinstated Islamism for the uninitiated. Hassan was succeeded by Mohammed III., a boy only nine years old, who, by his effeminate rule, led to the overthrow of the order, and was eventually murdered by the command of his son, Rokneddin, the seventh and last Old Man of the Mountains. In 1256 the Tatar prince, Hulaku, burst with his hordes upon the hill-forts of Persia held by the Assassins, and destroyed them. The Syrian branch was also nearly extirpated in 1270 by the Mameluke sultan, Bibars. But they still have representatives amongst the obscure Moslem sects of Syria and India.

See ANSARS, DRUSES; Hammer-Purgstall, *Die Assassinen* (1888); Walpole, *The Ansayrii and the Assassins* (1851); E. G. Browne, *Literary History of Persia* (1906); Miss Bell, *The Desert and the Sown* (1907).

Assault. In English law, a person is guilty of an assault if he attempts unlawfully to apply any force, however slight, to the person of another, or if he uses any gesture indicating an intention to commit an assault. If any force, however slight, is actually applied to the person or dress of another, the act amounts to *battery*. If a person violently deprived another of a member proper for his defence, such as a leg, an arm, a finger, an eye, or a fore-tooth, the ancient law held him guilty of *mayhem* or maiming; but this term is now obsolete. Violence is not necessary to constitute an assault; for the law, says Blackstone, cannot draw the line between different degrees of violence, and therefore prohibits the first and lowest stage of it, every man's person being sacred. Mere words can never constitute an assault.

Assault is a civil wrong, giving rise to an action for damages; and, as a general rule, the court will not interfere with the discretion of the jury in assessing the damages. It is sufficient to prove any act from which the unlawful intention may be implied. Thus, throwing water on a man, or riding after him and compelling him to run away, are both acts of trespass or assault. If X throw a lighted squib at Y, who in self-defence throws it from him so that it falls on Z, this is an assault by the first thrower, X, on Z. The defendant may plead that his act was unavoidable, or that it was committed by leave of the plaintiff, or in self-defence, or (if the plaintiff be his child) that the assault was committed by way of reasonable chastisement. He may also plead that the case has already been disposed of by a court of summary jurisdiction; and magistrates dealing with ordinary charges of assault are empowered to give a certificate which protects the person charged against further proceedings.

A common assault is a misdemeanour, punishable by one year's imprisonment. It is plain that

all crimes against the person, such as robbery or murder, include an assault. Special statutory provisions apply to the following cases of aggravated assault: (1) Indecent assault. It is an assault to take indecent liberties with a female, even if her consent is procured by fraud, as, e.g., if the offender pretends to be her husband. (2) Assaults on public officers, clergymen, &c. in the performance of their duties. (3) Assaults causing actual bodily harm, which are punishable by five years' penal servitude. Assaults with intent to do grievous bodily harm, as, e.g., by shooting, or administering poison, or placing an obstruction in front of a railway train, usually amount to felony, and are punishable with penal servitude for life. Maliciously starving a servant or apprentice is a misdemeanour.

Generally speaking, the same defences may be relied on in criminal and civil proceedings. But consent is no defence where the injury done extends to maiming, or to a breach of the peace. The principals in a prize-fight, for example, are guilty of assault, and all persons present at the fight are aiders and abettors in the commission of the offence.

In Scotland the principle of the law of assault, and of its aggravations, is very much the same as that above stated. In the Scottish system, it is laid down that it is of the utmost importance in all cases of actual assault to ascertain who struck the first blow, and the party who receives it will be excused for retaliating, if he do not exceed the just and fair measure of resentment. There, too, the highest of all aggravations is the assault with intent to murder. It is also an aggravation that the assault has been committed in pursuance of an old grudge, and on a principle of revenge; where, also, the offence has been accompanied with an intent to compel a rise of wages, or to deter from working at a certain rate, or in pursuance of a combination entered into for these illegal purposes. Another aggravation of the offence in Scotland is its being committed by a child on its parent, by a husband on his wife, or by any person upon another within his own house, although the latter crime falls more strictly under the antiquated term of *hamesucken*. The remedy in Scotland is, as in England, by civil action of damages, and by a criminal prosecution, both being maintainable, and the latter usually at the suit of the Lord Advocate, as public prosecutor; but the private injured party may prosecute criminally should the Lord Advocate decline to do so.

The Scots law formerly recognised a separate offence known as battery *pendente lite*, which consisted in assaulting an adversary in a lawsuit during its dependence. This offence was created by statute passed in 1584 and 1594, which provided, quaintly enough, that the offender should be punished by losing his cause. The statutes in question were repealed in 1826.

In the United States the same general definition of an assault is accepted. Special statutes provide for punishment of assaults on government officials while in the discharge of their duty; but in general, assaults, whether with or without a dangerous weapon, are punishable under state laws rather than under those of the United States.

Assa'ye, an Indian village in the extreme north-east of the Nizam's Dominions, 43 miles NE. of Aurungabad, the scene (best visited from Sillod) of a decisive victory gained by General Wellesley, afterwards Duke of Wellington, 23d September 1803, with 4500 men, over a Mahratta force of 50,000 under Sindia and the raja of Berar. About a third of Wellesley's small force was killed or wounded, while 12,000 of the enemy fell. The victory was the first great blow to the Mahratta supremacy.

Assaying is the art of determining the proportion of any specified metal in a given metallic ore or in an alloy. The various methods of estimating the amounts of base metals present could not, however, be usefully set forth within the limits of the present article, and the reader who requires technical information in regard to them is referred to the special works enumerated at the end: we shall here limit our attention to the methods commonly adopted for ascertaining the amount of gold or silver present in an ore or alloy.

Assaying of Gold and Silver Ores and Bullion.—The gold and silver in a sample of ore for assay are usually concentrated from the fused mass in molten lead, generally reduced from its oxide. The methods used are 'fusion' and 'scorification.' Where carbonaceous and some other harmful substances are present the ore must first be roasted. Such roasting is conducted in an open dish with free access of air in a muffle furnace.

Scorification.—The process of scorification is conducted in a muffle furnace, in a non-porous fireclay dish or 'scorifier' heated to a much higher temperature than for merely roasting. One part by weight of a carefully taken sample of the ore in a fine state of division is mixed in the scorifier with from ten to twenty times its weight of granulated lead and one-tenth its weight of borax, and the whole placed in the muffle. On withdrawing the scorifier after about half-an-hour, its contents are poured into a cup-shaped iron mould, and when cold the slag can be detached from the lead button. This latter contains all the gold and silver originally present in the ore, and only requires to be cupelled, as explained below.

Fusion.—The prepared ore is mixed with red-lead, charcoal-powder, carbonate of soda, and borax, in proportions depending on the nature of the ore, and placed in a crucible which is heated in an ordinary furnace for about a half to three-quarters of an hour, when the whole may be poured into a mould, and a lead button, containing the precious metals, obtained as in the scorification process.

Cupellation.—The 'cupellation' method of assaying gold and silver is of great antiquity. It depends essentially on the fact that molten litharge, monoxide of lead, PbO, is capable of holding in solution oxides of other metals with which it may be brought in contact, and thus separating them from unoxidisable metals. If, for example, gold, silver, copper, and lead are brought into a state of fusion in a current of air, the lead on becoming oxidised will take up the oxidised copper; the gold and silver, however, being unoxidisable, will not be so absorbed. The oxides are absorbed in a 'cupel,' formed of compressed bone-ash or other 'composition,' of some such form as is shown in fig. 1. The molten gold and silver, being unabsorbed, remain on its surface like a bead of mercury. One or more of these cupels, according to the number of assays to be made, are arranged on the floor of a muffle or oven of fireclay, provided with orifices at the sides and ends to produce the requisite draught, as indicated in fig. 2, and heated externally by anthracite, coke, charcoal, gas, or oil.

The operations comprised in the assay of an alloy containing silver by cupellation may be thus briefly described. A clean piece of the alloy, say ·5 gramme in weight, is accurately weighed on an assay balance. It may then conveniently be wrapped up in the whole or a portion of the lead required for cupellation in the form of foil. The amount of lead taken, being dependent on the proportion of oxidisable metal present in the alloy, will, of course, depend on the composition as approximately judged from the colour, appearance of cut, &c.: three times the weight of the assay-piece for fine, or nearly fine, silver, six times for

English standard (925 fine, or parts per 1000), and a still greater proportion for coarser varieties. The muffle having been raised to a red, but not

Fig. 1.

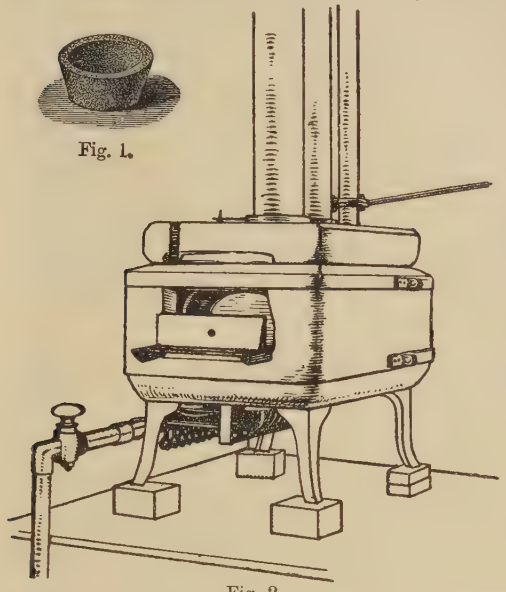


Fig. 2.

bright-red, heat, the assay parcel is charged into a cupel, and the temperature maintained uniform. After a lapse of from twenty minutes to half-an-hour it will be found that all the lead has been converted into litharge, and either volatilised or absorbed by the cupel, the completion of the operation being preceded by the passage of brilliant iridescent colours over the surface of the button, and, as soon as these cease, by an instantaneous increase in its brilliancy, known as *flashing* or *brightening*. The muffle is now closely shut up, and the temperature allowed to fall gradually until the button is set. It is then removed, hammered to detach adhering bone-ash, and weighed.

If there is reason to suspect the presence of small quantities of gold, it will only be necessary to dissolve the silver button, after weighing, in nitric acid (equal parts pure acid and water), collect the black deposit (the gold) that remains undissolved, and wash, ignite, and weigh it.

The cupellation assay for silver alone is now rarely practised. The losses due to volatilisation are large, and great care must be exercised in the regulation of the muffle temperature.

In many cases it is possible to ascertain the amount of silver present in an alloy without resort to cupellation. For this, the *wet*, or Gay Lussac's, method, it is essential that the composition be previously known within comparatively close limits. Knowing this, it is easy to calculate what weight of the alloy contains 1 gramme of pure silver. This amount having been dissolved in nitric acid (equal parts pure acid and water), a measured volume of solution of common salt, standardised so as to precipitate exactly 1 gramme of silver, is added. By vigorously shaking the bottle for a few minutes, the white precipitated chloride will agglomerate, leaving a clear solution above. On adding 1 cubic centimetre of a salt solution, one-tenth the strength of the one previously used, a white film appears on the surface, due to the precipitation of a further small quantity of silver chloride. The density of this film can be judged by placing the bottle against a black background, and is an indication of how much more salt solution should be added to precipitate all the silver. This quantity of salt solution is added, and the bottle reshaken. The end point is reached when no film appears on adding an additional cubic centimetre of the decimal salt solution. The volume of salt solution thus used affords a means of calculating how much silver was contained in the original assay sample.

The usual mode of ascertaining the approximate assay of a silver alloy is by the 'Volhard' method or by ordinary cupellation. The Volhard method consists in precipitating the silver from a known weight of the alloy dissolved in dilute nitric acid by a standard solution of ammonium sulphocyanide. The end point is determined by the appearance of a faint red colour, due to the reaction of the ammonium salt with a small quantity of iron alum previously placed in the silver solution. The iron is not attacked until all the silver has been thrown out of solution as silver sulphocyanide. The volume of ammonium sulphocyanide solution used indicates the amount of silver originally present.

The assaying of gold alloys is always effected by cupellation, and, in the rare event of silver being *known* to be entirely absent, a simple cupellation with lead, as in the case of silver, will suffice, a gold button being obtained and weighed. If, however, silver is present, silver is added if necessary, so that there may be a quantity of that metal equal to about two and a half times the weight of gold in the original alloy. The object of this *inquartation* is to obtain a button in which the gold is distributed like a sponge so as to facilitate the subsequent removal of the silver by solution in nitric acid. The amount of lead varies, as in the case of silver, with the composition. With gold, from pure down to 916·6 fine, about eight times its weight; from this point to 625·0 fine, twelve to twenty times; and for lower qualities, twenty-four times its weight will generally suffice. The assay-piece, which usually weighs half a gramme, having been very accurately weighed, is wrapped, together with the requisite silver, in the lead, and charged into a cupel in the muffle, either by hand or, when large numbers of assays are being done

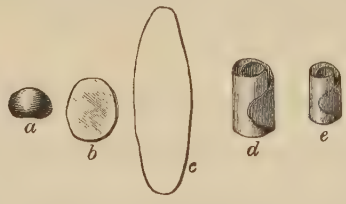


Fig. 3.

together, by a special charger. The temperature is appreciably higher than when cupelling silver. The phenomena observed are similar to those already described, and, on its removal from the cupel, the button, having the form shown at *a* in fig. 3, is brushed, flatted (*b*) on an anvil, annealed at a red heat, and drawn out into a *fillet* (*c*) in a small rolling-mill to about the thickness of a visiting-card, in order still further to facilitate the removal of silver. After being again annealed, this is coiled into a *cornet* (*d*) between the finger and thumb. In large assay offices, as in that of the Royal Mint, a platinum boiling apparatus is now generally employed. For smaller numbers of assays, the older method of boiling separately in 'parting' flasks is available. In the former method, each cornet is placed in a small perforated platinum cup, a number of these being ranged on a tray of the same metal, which is introduced into the acid (specific gravity 1·2) contained in a boiler, also of platinum. After remaining for

about twenty-five minutes the tray is removed, washed thoroughly in two quantities of hot distilled water, and then boiled for a similar period in a fresh quantity of acid of the same strength as before. On again being removed, the tray is washed, drained, and raised to a red heat in the muffle, which causes the dull-red fragile cornets to cohere, assume the yellow colour of gold, and shrink in about the proportion of *d* to *e* (fig. 3). The cornets are then weighed.

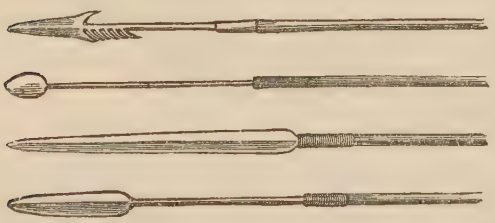
In parting in a flask, the cornet is boiled for ten minutes in 2 or 3 fluid ounces of the first acid, the flask nearly filled with hot distilled water, and decanted. A similar quantity of the second acid having been added, the boiling is continued for fifteen minutes, and water again added. After decanting, and once or twice washing, the cornet is transferred to a small porous crucible, in which it is annealed at a red heat, and then weighed.

Proofs or Checks.—It is always preferable in both the cupellation and volumetric methods of assays for gold and silver to have proofs or checks, which are made up of pure metals, and are of similar composition to the alloy to be tested. They are treated in exactly the same manner as the true assays, and the losses (or gains) which they sustain must be added to (or subtracted from) the final weight of those assays.

Where both silver and gold are contained in an alloy, it becomes necessary either to perform separate assays or to subject one assay-piece to cupellation twice. The assay is first conducted without adding silver, and the resulting button weighed as though it were a silver assay. After adding silver and lead, the button is again cupelled and treated as a gold assay. The weight of gold finally obtained is deducted from that of the first button, and the difference gives the weight of silver present. Some experience is necessary in order to estimate this latter metal accurately.

For detailed information see Beringer, *Text-book of Assaying*, 15th ed.; Rose, *Metallurgy of Gold*, 6th ed.; Wraight, *Assaying in Theory and Practice;* E. A. Smith, *Sampling and Assay of the Precious Metals.*

Assegai, or ASSAGAI, a slender spear of hard wood, tipped with iron, used in battle by the South African tribes, notably the war-like Zulus. Some



Various forms of Assegais.

assegais are held in the hand and used as spears for thrusting; shorter ones are hurled from the hand as missiles. The Berber word *zaghāya* was adopted by the Moors into Arabic (with the article *al*), and thence into Spanish and Portuguese. It was the Portuguese use of it in Africa that passed into English and French. It had already been used in Middle English in the forms *archegaye* and (as in Chaucer) *launcegay* (compounded with *lance*).

Assegai Wood, a hard timber, useful for wagon and carriage building, yielded by the South African cornaceous tree *Curtisia faginea.*

Assemani, (1) JOSEPH SIMON, a famous orientalist, born of a Maronite family at Tripoli, in Syria, in 1687. After completing his studies at Rome, he travelled on the pope's commission through Egypt and Syria, collecting many oriental MSS. and coins for the Vatican Library, of which he was appointed keeper. He died at Rome, January 14, 1768. Of his numerous learned works, the most important is his *Bibliotheca orientalis Clementino-Vaticana* (4 vols. Rome, 1719–28), containing the Syrian MSS. of the Vatican. He was succeeded as keeper of the Vatican Library by his nephew, (2) STEPHEN EPHODIUS (1707–82), also a learned author of books on orientalist learning. Yet another nephew and orientalist was (3) JOSEPH ALOYSIUS (1710–82), professor at Rome.—(4) SIMON, a relative of the preceding, was born at Tripoli in 1752, filled the chair of oriental languages at Padua, and died there, April 8, 1821. One of the greatest orientalists of his time, he wrote an important work on ancient coins, *Museo cufico Naniano illustrato* (2 vols. Padua, 1787–88).

Assembly, GENERAL, is still, as it was in colonial days, the name of the collective legislature of some of the United States; but is better known as the official name for the highest court in the greater Presbyterian Churches in Scotland, Ireland, India, the Dominions, and the United States. It represents both the lay and the clerical element in the church, and possesses legislative and judicial authority in all matters purely ecclesiastical. The General Assembly of the Established Church of Scotland consists of representatives, clerical and lay, from all the presbyteries of the church. The royal burghs of Scotland also return elders to the General Assembly of the Established Church, and each of the Scottish universities sends a representative. The Assembly meets once a year, in the latter part of May, at Edinburgh, and sits for ten days. Its deliberations are presided over by a Moderator, whose election is the first step in the proceedings, after a sermon by his predecessor. In former times this office was sometimes filled by laymen—among others, in 1567, by George Buchanan. In modern times the moderator is always a clergyman. Eighty-four presbyteries, composing sixteen synods, return members to the General Assembly of the Established Church of Scotland. Its relation to the state is represented by a royal commissioner, who exercises no function in the Assembly beyond that of adding by his presence the sanction of the civil authority to its proceedings. The other functionaries are a principal and a depute clerk (both clergymen), a procurator, and an agent. All business not despatched during the session is referred to a commission, with the moderator as convener, which meets immediately after the dissolution of the Assembly, and again at intervals of three months. The General Assemblies of the Free Church of Scotland (in 1900 joined with the United Presbyterians as the United Free Church) and of the Irish Presbyterian Church are similarly constituted save in comparatively minor matters—such as the absence of the royal commissioner. There are also General Assemblies of 'the Presbyterian Church in the United States,' the Cumberland Presbyterian Church, and the United Presbyterian Church of North America; while the Reformed Presbyterian Synod, the Associate Reformed Presbyterian Synod, and the Associate Synod of North America call their supreme courts synods. See PRESBYTERIANISM, SCOTLAND, FREE CHURCH.

Assembly, NATIONAL. See CONVOCATION; also FRANCE.

Assembly of Divines. See WESTMINSTER, CONFESSIONS OF FAITH.

Assen, chief town of the Dutch province of Drenthe, connected with the Zuyder Zee by canal, and with Groningen by railway; pop. 18,000.

Asser, King Alfred's biographer, was a monk of St Davids (*Menevia*), who, about the year 885, was invited to the court of Alfred. Here he resided at intervals till the king's death (901), assisting him in his studies, and enjoying an affectionate confidence, of which he seems to have every way been worthy. Alfred promoted him to various dignities, and prior to 900 made him Bishop of Sherborne. He died in either 909 or 910. His life of Alfred, *De rebus gestis Ælfredi Magni*, was published, with interpolations, in 1572, by Archbishop Parker. Its genuineness was questioned by Wright and Howorth, but was accepted by Kemble, Pauli, Stubbs, Freeman, and Stevenson. Wise's edition (1722) preceded Petrie's *Monumenta Hist. Brit.* (1848); by far the best is Stevenson's (1904).

Assessment is a valuation of property, income, or profits, for the purpose of taxation, made by authorised persons according to their discretion, as opposed to a sum determined by law; or the fixing of the amount of damages, as by a jury. See TAX, COSTS, DAMAGES, VALUATION.

Assessors are persons sometimes associated with judicial functionaries, to assist in the argument and procedure before them, and to advise their judgments. They may be usefully employed by persons in judicial stations whose previous education and pursuits scarcely qualify them for the duties cast upon them. Assessors are usually barristers or advocates learned in the law, and familiar with judicial proceedings. By the Municipal Corporation Act, it is enacted that the burgesses shall annually elect from among those qualified to be councillors two auditors and two assessors, the former to audit the accounts of the burgh, and the latter to revise the burgess list. In the ecclesiastical law of England, a bishop, who is a spiritual judge, is assisted by his chancellor, as the episcopal assessor, and who in fact holds courts for the bishop. But in the case of a complaint against a clergyman for any ecclesiastical offence under the Church Discipline Act of 1840, the bishop is directed to inquire into the matter, assisted by three assessors, of whom the dean of his cathedral, or one of his archdeacons, or his chancellor, must be one, and a barrister another. In Admiralty cases the judges may command the assistance of nautical assessors. The judges of the common law courts and the King's counsel are, as a condition of their offices, assessors, or more properly assistants, of the House of Lords, advising the House on points of law which may be propounded to them by their lordships. In the Scottish universities, certain nominated members of the university court are called assessors.

In the United States, the term is only employed in the common sense of persons elected or appointed to determine the value of property liable to assessment.

As'sets (Norman-French *asez*, 'enough,' from late Lat. *ad satis*, 'to sufficiency'), a term signifying the property of a deceased person which is sufficient in the hands of his executor and heir for the payment of his debts and legacies. In strictness, therefore, the term is not applicable to the property of a person who dies intestate, and without any debts to be paid. In general acceptation, however, it is understood to mean the property left for distribution by a deceased person, whether testate or intestate; and in commerce, and also in bankruptcy and insolvency, the term is used to designate the stock in trade and entire property of all sorts belonging to a merchant or to a trading association.

Assets are either *personal* or *real*, the former comprehending such goods, chattels, and debts as devolve on the executor; and the latter including all real estate, whether devised or descending to the heir at law. In connection with this distinction, assets are also said to be *assets by descent*, and *assets in hand*, the former of these being recoverable from the heir to whom the land descends, and so far as such lands will extend—assets in hand, again, signifying such property as a person leaves to his executors sufficient for the clearing of burdens and bequests affecting his personal estate. Assets are also in their nature either *legal* or *equitable*, according to the nature of the remedy which may be used by creditors against the executor or heir. Where there are several creditors of equal degree, the executor is bound to pay him who first obtains judgment for his debt; and he cannot resist on the ground that nothing will be left for the other creditors. If, after exhausting the whole assets which have come to his hands, by the payment of debts in due order, he be afterwards sued by a creditor remaining unpaid, he is entitled to protect himself by an allegation that he has fully administered, or technically by a plea of *plene administravit;* and upon this plea the creditor is entitled to judgment that he shall be paid out of any other assets that shall come to the defendants—which is called a judgment of assets *in futuro*.

Assets is not a law term in Scotland, but it is nevertheless much used in the business of that country.

In the United States, the assets are broken up into several funds, and where some of the creditors can resort to two or more funds, while others can legally only resort to one, a court of equity will, by 'marshalling assets,' compel the more fortunate creditors to exhaust the fund first upon which they have the exclusive claim; or, if they have been satisfied from the general fund, to permit others to stand in their place as to the exclusive fund, that so an equitable division of assets may be made among all the creditors.

Assheton, WILLIAM (1641–1711), a pioneer of insurance, was born at Middleton, Lancashire. He studied at Oxford, became a fellow of Brazenose (1663), and chaplain to the Duke of Ormonde, who was chancellor of the university. He was made a prebendary of York, and held livings in London and Beckenham, where he died, having declined the mastership of his college. He published many discourses and theological works, among others *The Possibility of Apparitions* (1706), occasioned by Defoe's story of Mrs Veal. His scheme for providing annuities for widows of the clergy and others was adopted by the Mercers' Company (1698), but broke down. Parliament was appealed to in 1747, and enabled the company to meet its engagements.

Assidians. See CHASIDIM.

Assien'to (Span. *asiento*, 'contract'), a word specially applied to a contract between Spain and some foreign nation, according to which the Spanish government conferred upon the latter, under certain conditions, the monopoly of the supply of negroes for its American colonies. Charles V. first formed such a compact with the Flemings; and similar ones were entered into with the Genoese (1580), with the French Guinea Company (1702), and with England (1713). The British government made over its privilege to the South Sea Company for thirty years, permission being also granted to send yearly a ship, carrying 500 tons of goods, to the Spanish colonies. The misunderstandings arising hence contributed not a little to the war that broke out between the two nations in 1739. At the peace of Aix-la-Chapelle in 1748, the English company having still four years to run, their rights were guaranteed to them; but they relinquished them

at the Madrid Convention of 1750, upon the payment of £100,000, and the concession of certain commercial advantages.

Assign is a legal term used in both English and Scottish law to indicate generally the transfer of property, but more particularly the transfer of movable property and personal rights. The word is also applied to the person, generally spoken of as the 'assignee,' to whom the transfer is made.

Assignation is a form in Scots conveyancing, analogous to the English Assignment (q.v.), by means of which the holder of any right, or the creditor in any obligation—including even a future right which is not yet vested—transfers his right to another. The party making the assignation is called the *cedent*, and the party in whose favour the assignation is made is called the *assignee* or *cessionary*, words which are derived from the French law. In the case of debts, there was originally no power in the creditor to assign his right, and, accordingly, the old form of assignation still shows that the transaction was regarded as one of mandate to recover the money for the creditor. Now, however, it is recognised that an assignation operates as a direct conveyance, by which the whole right of the creditor is transferred to the assignee, who comes exactly in place of his author. Simple forms of assignation have been introduced by statute; but it is settled that a written instrument of assignation need not be couched in any formal words, or even contain words of actual conveyance. In order, however, to complete the assignation, it must be *intimated* to the common debtor—that is, the party originally indebted to the cedent—and so essential is this intimation that in the case of competing claims against the right, interest, or estate assigned, the assignation first intimated will be preferred to one prior in date, but posterior in the date of intimation. Various modes of intimation to the debtor are recognised at common law or have been introduced by statute. Mere private knowledge on the part of the debtor is of no avail in a competition between assignees or between an assignee and an arresting creditor. But there are certain assignations which require no intimation, such as adjudication and other judicial assignations, and the statutory conveyance to a trustee in bankruptcy. The assignation of a debt implies and warrants that the debt is due, but not that the debtor is solvent. Bills, notes, and other negotiable instruments do not require assignation, but pass by indorsation and delivery. Special statutory provision is made for the assignation of policies of insurance, patents and designs, copyrights, shares in ships, registered leases, and shares in a company. Rights arising out of a contract which involves *delectus personæ* are not assignable by one of the contracting parties without the consent of the other. The terms of a contract, e.g. a contract of lease, may expressly exclude assignees. An alimentary right or provision cannot be assigned in advance except to the extent by which it exceeds what is reasonably necessary.

Assignats. After appropriating to national purposes the land belonging to the church, the French National Assembly, instead of bringing it into the market at a time of insecurity, when its value was depreciated, issued bonds on the security of it, which were called *assignats*, as representing land *assigned* to the holder. This paper-money consisted chiefly of notes for 100 francs (£4) each, though many of them were for lower sums; and the first issue, in 1790, amounted to 400 million francs. The system relieved the government; 'the assignats saved the revolution' for the time being. The facility of this plan of providing government income led to its being repeatedly had recourse to, as the property of wealthy émigrés was confiscated, till the amount rose to the enormous sum of 45,578 million francs, besides great numbers of forged notes—for the assignats were easily counterfeited. The value of the assignats naturally soon began to decline, and confidence once gone, the declension became fearful. In June 1793 one franc in silver was worth three francs in paper; in August it was worth six. The state took the most extreme measures to compel the acceptance of these notes at their full nominal value. The effects of these were to cause the assignats to flow back into the public treasury, to raise the prices of all commodities, and to make every one averse to have any dealings with the state. All business became disorganised. At last the value of assignats sank almost to *nil*. Millions had suffered incalculable loss, and only a few who had bought public lands with the assignats that cost them little or nothing had enriched themselves at the expense of the community. In March 1796 a louis d'or (24 francs) bought 7200 francs in assignats. After this they were withdrawn from the currency, and redeemed at a thirtieth of their nominal value, by 'territorial mandates,' a new kind of paper-money, which enabled the holder at once to take possession of public lands at the estimated value, while assignats could only be offered at a sale. The *mandats* also soon fell to a seventieth of their nominal value, and were returned to government in payment of taxes or of land. The disastrous system of compulsory paper-credit came to an end early in 1797.

Assignee. See ASSIGN, ASSIGNATION. An Assignee in Bankruptcy is one of the persons officially appointed to manage a bankrupt estate for the benefit of the creditors, now called *trustee*. See BANKRUPTCY.

Assignment, in the law of England, is a general term signifying a transfer of property. The word denotes either the act of assigning or the instrument by which it is done. In a more special sense the term is applied to the transfer of personal rights of property which can be enforced only by action and not by taking physical possession. Such proprietary rights *in personam* are termed *Choses in action* (q.v.). At common law a *chose in action*—except in the case of instruments recognised by the law merchant as negotiable—could not be assigned so as to enable the assignee to sue upon it in his own name. From an early period, however, the Court of Chancery, in the exercise of its equitable jurisdiction, recognised as valid the assignment of contractual rights and other *choses in action*. Such an equitable assignment was effective to transfer an equitable, though not a legal, right to the *chose in action*. *Choses in action* remained unassignable in law until sec. 25 (6) of the Judicature Act, 1873, made provision for their legal assignment. This section of the Judicature Act, 1873, which enabled the legal right to a debt or other *chose in action* to be transferred to the assignee together with all legal rights and remedies, is repealed by the Supreme Court of Judicature Act, 1925, sec. 226 (Sixth Schedule); but its provisions are substantially re-enacted by sec. 136 (1) of the Law of Property Act, 1925, which provides that any absolute assignment by writing under the hand of the assignor (not purporting to be by way of charge only) of any debt or other legal thing in action, of which express notice has been given to the debtor, trustee, or other person liable in respect thereof, is effectual in law (subject to equities having priorities over the right of the assignee) to pass and transfer from the date of such notice (*a*) the legal right to such debt or

thing in action, (*b*) all legal and other remedies, and (*c*) the power to give a good discharge. A legal assignment—i.e. one which passes the legal ownership of the *chose in action* from the assignor to the assignee—must, under the provisions of the act, be in writing signed by the assignor. But any assignment which would, prior to the Judicature Act, 1873, have been recognised by a court of equity as a good equitable assignment, is still capable of operating as such, even though it fails to conform to the requirements of a valid legal assignment. Thus an assignment may be effectual as an equitable assignment though made by parol only. No consent on the part of the debtor or fundholder is required to an assignment. But it is necessary to give the debtor or fundholder notice of the assignment. The debtor or fundholder, on receiving notice of the assignment, becomes bound to pay the debt, or transfer the fund, to the assignee. When a debt, trust fund, or other *chose in action* has been assigned to two or more assignees, the title of that assignee who has first given notice to the debtor or trustee of his assignment will prevail. Whether an assignment is legal or equitable the assignee is subject, in enforcing his right against the debtor or fundholder, to be met by any defence which the debtor or fundholder might have raised, at the date at which notice of the assignment was given to him, against an action brought by the assignor himself.

Contractual rights are, as a general rule, assignable. But where a contract involves personal skill or confidence between the parties, or obligations personal in their nature, e.g. a contract of personal service, it is not assignable. Again a contract may be rendered unassignable, or its assignment restricted, by express provision to that effect in the contract. Certain *choses in action* are, on grounds of public policy, not capable of assignment. Thus a right of action for damages for a tort is in general unassignable. Public policy also forbids that effect should be given to assignments of salaries of public servants of the crown and officers in the army or navy, whether on half-pay or full-pay. Rights under Bills of Exchange (q.v.), Promissory Notes (q.v.), and other negotiable instruments may be transferred, according to their special character, by endorsement and delivery or by delivery alone. The transfer or assignment of certain *choses in action* is governed by special statutory enactments, e.g. shares in companies; policies of life assurance; policies of marine insurance; copyrights; patents. By virtue of various statutory enactments, now embodied in secs. 52 and 53 of the Law of Property Act, 1925, an assignment of a lease, whether of the reversion or of the term, must be made by deed.

In the United States the general rule is that all rights of property, real or personal, and all *choses in action*, as bonds, notes, judgments, mortgages, debts, contracts, agreements, relating both to real and personal property, are assignable, and that the assignment thereof will pass to the assignee a right of action in the name of such assignee against all parties liable to an action. Assignment carries with it all remedies held by the assignor for the collection of a debt or the fulfilment of a contract, and is subject to all the equities and charges which attached in the hands of the assignor. Rights arising out of contracts for personal services or involving a relation of personal confidence are not assignable. In many states of the Union statutes are in force with respect to the mode in which assignments may be effected and the registration or recording of transfers of certain kinds of property. The assignment of copyrights, patents, and some other particular classes of rights is governed by acts of congress. For Scots Law, see ASSIGNATION.

Assignment of Error. See ERROR, APPEAL.

Assimilation is the process by which living organisms absorb nutriment and convert it into part of their own substance, solid or liquid. See DIGESTION. In particular the word is applied to the separation of oxygen from carbon dioxide in the green parts of plants, and its working up into organic compounds. See CHLOROPHYLL, PHYSIOLOGY (VEGETABLE).

Assiniboia was from 1882 till 1905 a Canadian district or territory within the limits of the North-west Territories; west of Manitoba, bounded on the south by the United States frontier, west by Alberta territory, north (at 52° N.) by Saskatchewan. In 1905, when Saskatchewan and Alberta became provinces, Saskatchewan got most of Assiniboia, and Alberta a narrow slice in the west. The capital, Regina, became capital of Saskatchewan.

Assin'iboine, a river of the Canadian North-west, formed by the junction in Macdonald county, Manitoba, of the Qu'appelle and Souris Rivers; at Winnipeg it joins the Red River (q.v.), which discharges its waters into Lake Winnipeg. At a point 140 miles from its mouth the Assiniboine is 230 feet broad, and its mean depth over 8 feet; its course measures about 400 miles. It is named from the Assiniboins ('stone-boilers,' because they heated water by dropping hot stones into it), the Algonquin Indians of the country, still 2000 or 3000 in number. From it Assiniboia took its name.

Assinie, a town in the Ivory Coast Colony (q.v.), on a lagoon 30 miles E. of Grand Bassam. It was occupied by the French in 1843.

Assi'si, a town of central Italy, picturesquely situated on a steep hill, 14 miles SE. of Perugia by rail, with old walls and a citadel in ruins. It was the birthplace of St Francis (see FRANCIS OF ASSISI), who there in 1209 founded the mendicant order that bears his name; of St Clare; and of Metastasio. Assisi has two Gothic churches, one surmounting the other, with frescoes and paintings by Cimabue, Giotto, and other masters; beneath, in a crypt (1818), are the relics of St Francis. Assisi has also a cathedral; the church of Santa Maria was built out of a temple of Minerva. St Clare's convent (St Damian) is close by. Pop. of commune (1921) 19,720.

Assiut, or ASSIOUT. See SIUT.

Assize. This word, literally signifying a 'sitting' or 'session,' is a term used in the principal European legal systems, and very much in the same senses in all. As is common with regard to most of our ancient legal technicality, the Latin language, in the first instance (*assideo*), and then the French (*assis*), appears to have led to its introduction into the phraseology of the law of England, and, it may be added, also of Scotland, although in the latter country it has a more limited application in judicial procedure than in England, *assize* being in Scotland the old technical expression for a jury. In England, this word may also signify a jury, and it is sometimes used to denote an ordinance, decree, or law. But in modern practice, it is commonly applied to the sessions or sittings of the judges of the High Court of Justice, held periodically in each county, for the purpose of administering civil and criminal justice. These courts came into use in room of ancient justices in eyre, *justiciarii in itinere*. The Statute of *Nisi Prius*, in the time of Edward I., gave a general jurisdiction in civil business to the judges acting in land disputes under the Assize of Northampton in 1176. They are now appointed by commissions issued twice a year to the judges of the High Court of Justice, two judges being generally assigned to each circuit. These commissioners or judges of assize are sent twice in

every year on *circuits* all round the kingdom to make inquiry into crimes committed in certain counties, and to hear and determine the same according to law, or to try certain civil and criminal cases which are ready for trial; and occasionally a third circuit is appointed for jail delivery. The circuits are eight in number—Northern, North-eastern, Midland, South-eastern, Oxford, Western, North Wales and Chester, and South Wales. The judges or commissioners are authorised to try criminal cases in virtue of (1) a commission of *oyer* and *terminer*, which applies to prisoners against whom true bills have been found at that particular assize; and (2) a commission of general *jail* delivery, which enables them to try all persons in prison or on bail. A third commission—that of assize—empowers them, *inter alia*, to try civil cases. Incident to this third commission is the jurisdiction to try cases at *nisi prius*—i.e. all questions of fact issuing out of the courts at Westminster that are then ripe for trial by jury. These, by the ancient course of the courts, were usually appointed to be tried at Westminster in some Easter or Michaelmas term, by a jury returned from the county wherein the cause of action arose; but with this proviso, *nisi prius*, unless before the day fixed the judges should come into the county in question, which in modern times they have invariably done in the vacations preceding; so that the trial has always, in fact, taken place before these judges. At least one judge of the High Court goes round each circuit three times a year—in winter, in summer, and in autumn. The circuit system, however, does not extend to London and Middlesex, which have instead courts of *nisi prius*, which are held before the chief or other judge of the superior courts for the trial of civil causes, at what are called the London and Westminster Sittings; and the establishment of the Central Criminal Court has sufficiently provided for the administration of criminal justice within these districts.

The circuit courts of Justiciary in Scotland (now technically sittings of the High Court) resemble the assizes, and have, in criminal matters, a like jurisdiction; but in civil causes their authority is limited to the hearing of appeals from Small Debt Courts, although civil trials by jury in the Court of Session are occasionally set down for circuit. Scotland is divided into three circuits, the North, South, and West. Formerly there were only two courts held in the year, with an additional court at Glasgow. In 1882 it was found necessary, by Act of Adjournal following on Order of Privy-council, to provide for three additional courts in Glasgow, and two additional at Perth, Dundee, and Aberdeen.

In the sense of an ordinance or law, the term assize has various applications, although chiefly in the more ancient systems of jurisprudence. Thus, the 'Assizes' of Jerusalem were a code of feudal laws for the kingdom of Jerusalem, formed in 1099 by an assembly of the Latin barons and of the clergy and laity under Godfrey of Bouillon. Then there were in England the Assize of Bread, the Assize of the Forest, the Assize of Clarendon. The word was often applied to particular action connected with land. See also JURY.

Assmannshau'sen, a village on the Rhine, 3 miles below Rüdesheim, famous for the red and white wine which is produced on the slate-mountains in its vicinity. The red wine (Assmannshäuser) resembles Burgundy, and possesses a rare aromatic flavour. The choicest sort, which is preferred by connoisseurs to all the other red wines of the Rhine, is cultivated in the once ducal (afterwards Prussian) vineyards near Wiesbaden.

Assmayer, IGNAZ (1790–1862), composer, born at Salzburg, directed the Vienna Tonkünstler-Societät, composed masses, oratorios, and requiems.

Associate Synod, ASSOCIATE PRESBYTERY. See UNITED PRESBYTERIAN CHURCH.

Association. See, besides the following articles, CO-OPERATION, COMPANY, SOCIETIES, LEAGUE, COMBINATION, CONSPIRACY; also ECOLOGY, FOOTBALL.

Association of Ideas was a term first used by Locke for the mental collocations which facilitate recollection—phenomena discussed as early as Aristotle's time. Actions, sensations, feelings, emotions, thoughts, ideas occurring in close succession tend so to cohere that subsequently when one is presented to consciousness the others are apt to arise. Aristotle, dealing with memory, recognised three principles of mental resuscitation—similarity, contrariety, and coadjacency—and in this was followed by many philosophers, though it was disputed whether contrariety was really an independent element, since contraries are relatives which, like father and son, imply one another. Ludovicus Vives, an Aristotelian of the 14th century, was the first to specify in detail the circumstances that determine the adhesive bond of recollection. Hobbes made contiguity the foundation of reminiscence. Hume recognised resemblance, contiguity, and causation. But it may be argued that causation, like order in place and order in time, is but a case of contiguity. Hume made the principles of association into 'laws,' which explained not only how idea follows idea, but how the mind built up its knowledge of the world. Association played a large part in the philosophy of Hartley. Thomas Brown was a severe if not unfair critic of Hartley, and preferred the term suggestion to association; but he also assigned great prominence to the associative principle in sense-perception ('external affections' of mind), and referred all other mental states to the two generic capacities or susceptibilities of simple and relative suggestion. The term 'Associationist school' was given rather loosely to many who, in very various degrees, sought to explain most or even all mental acquirements and the most complicated mental processes by association, including Hobbes, Hume, Condillac, Hartley, Priestley, James Mill, Bain, and Spencer. Bain sought to refer association and all that depended on it to the two 'laws' of contiguity and similarity.

Many of the writers named kept the psychological as distinguished from the merely epistemological aspect of association in view, and all of them would have repudiated any intention to deal with the matter otherwise than psychologically. And Herbert Spencer insisted further that the psychological fact of conscious assimilation corresponded with the fundamentally simple psychological fact of re-excitation of the same nervous structures. Nevertheless, it must be said that the associationists' way of dealing with the 'laws' of association was epistemological rather than truly psychological, and implied a somewhat mechanical and atomic scheme of the mind and of the way in which the elements of knowledge came together. In recent psychological research it has become usual to refer the associating of ideas to specific groupings of mental processes. Psychology does not suggest, as associationism did, that scraps of consciousness are, as it were, waiting in the antechamber of the subconscious, ready to be associated. Rather it is the conscious or subconscious processes that stand related and become more or less unified; there is no distinct bit of consciousness answering to the associative bond itself—there is probably no actual associative bond. Not till we have made a full analysis of the mind during the associative process,

not till we know all the conditions under which association takes place, not especially till we have measured the time-conditions can we fairly claim to have grasped the problem. Experimental psychology is a comparatively new science, and its work is yet far from complete. But it is definitely ascertained that frequent occurrence, recentness of the experience, vividness, certain relations of place and position, and power to attract and maintain the attention are real conditions of mental association. By reason of frequent repetitions, by reason of recent excitation, and so on, there is a tendency for nervous processes to discharge in certain particular ways. Neural disposition determines the direction of the discharge, and so regulates the appearance in consciousness of the associated items. The process of successive association picks up elements here and drops them there, but is continued by a common thread, now slender and simple, now complex and variegated. The associated elements of consciousness are sometimes multitudinous and confused, sometimes clearly and definitely presented. Sometimes a single element prevails, sometimes a combined strand of two or more streams of influence. The discussion of the so-called 'laws' of contiguity, similarity, contrast has been superseded by the analysis of the contents of the association and the conditions under which the relative processes of consciousness take place. As Professor Stout puts it, 'The basis of all associative connection is the concurrence of distinct experiences in the formation of a single cumulative disposition, which tends to be re-excited as a whole whenever any of the experiences recur which have combined to produce it.' The elements may, of course, be indefinitely modified, but the tendency is to the revival of the total experience exactly as it was formerly experienced. See PSYCHOLOGY, MNEMONICS.

Associations, Trusts, and Cartels.—'Associations' is the official term usually given in Great Britain to those large industrial combinations which are occasionally floated with the object, more or less openly avowed, of eliminating competition and raising prices—in other words, of securing monopolistic profits. The Bradford Dyers' Association, the Bradford Woolcombers' Association, the British Cotton and Wool Dyers' Association, the Calico Printers' Association, and Associated Portland Cement are well-known instances. But with the possible exception of the famous Coats' company, which has beaten or absorbed nearly all competitors in the manufacture of sewing cotton, there is no example in Great Britain of any capitalistic company in any competitive business having succeeded in permanently raising the prices of its products above their natural level, or of extracting what may be called monopoly profits from the consumer. Of course there are a number of natural local monopolies in this country, as in other countries, such as gas and water, which are sold to consumers at fixed prices under private Acts of Parliament by water companies or by municipal corporations and urban district councils. But this is quite another matter. In a country which has no protective tariff, monopoly prices for ordinary articles cannot be imposed, because, even if by huge combinations it were possible to eliminate home competition, the competition of foreign goods would make monopoly prices impossible. The only case in England of an artificial monopoly fostered and maintained by the law is provided by the trade in alcoholic liquors. Here we find that in most districts the retailing of beer and spirits is confined to licensed houses, nearly all of which are 'tied' to some particular brewery. A brewery buys licensed houses, and then puts in a tenant, who is bound or 'tied' to sell only the beer of his landlord, the result being that a monopoly price can be obtained, or (as most frequently happens) an inferior and adulterated beer can be sold at the ordinary price.

But the liquor trade is the exception which proves the rule. For, of course, no one denies that monopolies can be created by the state. They were so created in the reigns of Elizabeth and James the First by royal grants or patents to courtiers and favourites. But these abuses were abolished by the statute of monopolies which restricted such grants to patent rights. Patents and copyrights are the rewards of inventors and authors, while trade-marks are for the protection of manufacturers and traders who have made a reputation as makers of, or dealers in, some particular article. Patents and copyrights are only allowed for a term of years; but by a very proper reciprocity, the property in a book or invention has now been extended to other countries; so that these rights and privileges may be said to possess an international sanction.

In order to see the baneful effects of those monopolistic 'associations' which come within the scope of this article, it is necessary to turn to other countries, more especially to the United States and Germany. The United States is the classic land of 'trusts,' which have now flourished for thirty years or more under a system of high protection. It was under the shelter of tariffs originally imposed for revenue during the civil war between north and south that the American trusts sprang up. But as these mighty combinations of capitalists found themselves enriched by the tariff, they began to 'log-roll' in the Congress and the Senate for a higher and a higher tariff on the articles in which they were interested. And with such success that an ingenious writer once published what he called *The United States Tariff for Trusts*, showing the percentage obtained by the iron and steel kings, the woollen and worsted magnates, the coal kings, and beef barons, the sugar lords, the tobacco trust, &c. Mr Havermeyer once frankly avowed that the American tariff is the 'mother of trusts;' but hitherto every effort to strike at the root of the trouble has been unavailing, owing to the corruption by vested interests of more than half the Senate and Congress. Hence the Payne-Aldrich Tariff of 1909 was practically as high as its famous or infamous predecessor the Dingley Tariff. The only important American trust which has succeeded in imposing monopoly prices without much assistance from the tariff is the Standard Oil Trust, the unique organisation of Mr Rockefeller, which gradually acquired practically all the oil resources of the United States, and engrossed almost the whole of the oil trade in all its branches. This is the leading case of a more than national monopoly attained by the skilful and relentless use of the money power. The next analogy is the United States Steel Trust, which now possesses an enormous share, not only of the iron and steel plant, but also of the iron ore and coal-mines of the United States. But the fortunes of Mr Carnegie and of the other steel kings came very largely out of the pockets of the American tax-payers. The principal reduction of the Payne Tariff (1909) was in the iron and steel schedule, and was made on the representations of Mr Carnegie, who declared at the tariff hearings that the iron and steel industry did not require any protection. Next to the tariff, the most potent source of trust power and profit lay in the manipulation of railroad rates. The directors of the trust corporations and of the railroad corporations were often identical. In one of the many cases which came before the courts, it was proved that a railroad company in Ohio was charging the Standard Oil Company a 10 cent. rate and an independent

competitor a 35 cent. rate for carrying oil the same distance under the same circumstances. Probably even Mr Rockefeller's genius could not have established the oil monopoly but for this corrupt alliance with the railroads of Pennsylvania and Ohio.

These scandals at length led to the passing of the Sherman Anti-Trust Act of 1890, which made illegal 'every contract and combination, in the form of a trust or otherwise, in restraint of trades or commerce among the several states or with foreign nations.' Under this act an enormous number of prosecutions have been at various times undertaken, and the system of preferential rates on American railroads has been checked, if not wholly suppressed. The legal form of trust seems to have been first devised by the Standard Oil Company, which was formed in 1882. A trust is a combination of corporations or companies, and takes the form of a surrender by the stockholders of the various corporations entering the trust of their separate holdings to a board of trustees, who receive an irrevocable power of attorney, and issue in return trust certificates representing equitable shares in the combined properties. Thus the business of all the combined corporations is concentrated under the management of the trustees, and the pooled profits are distributed to the holders of the certificates in proportion to their holdings. This was the original organisation; but now, to meet hostile legislation, many trusts have returned to the corporation form—an easy transformation, for it is only necessary to issue to each holder of a trust certificate a corresponding amount of stock in the new corporation. On the score of industrial efficiency, the American trust presents many disadvantages, and in periods of crisis, such as 1903 and 1907, many trusts, as well as many ordinary corporations, have gone into the hands of receivers. Perhaps the most notorious failure was the Atlantic Shipping Trust, incorporated under a New Jersey Charter in 1902, with the official title of the International Mercantile Marine Company. This has been wittily described as an attempt to 'Morganise' the ocean, Mr Pierpont Morgan having been in fact the promoter of the scheme. Five English shipping lines, comprising 118 large steamers, were bought up, and the London yellow press predicted the end of our maritime supremacy. The trust was financed by a share capital of 120 million dollars and a debenture capital of 50 million dollars. The capital and the board were at first predominately American. But it soon turned out that the ships had been bought at excessive prices; the American capitalists retired with loss, and the English resumed control, buying back cheaply what they had sold dear. It should be added that in 1903 the United States Shipbuilding Trust went into a receiver's hands.

The characteristic difference, it has been said, between the American Trust and the German Cartel (in German, *kartell*) is as follows: Whereas the trust is a combination in which the individual firms or companies combined are entirely merged and absorbed, the creation of a *kartell* only combines the firms into a syndicate *for certain purposes*, allowing the individuality of its members to continue so far as is consistent with the business policy of the federation. *Kartells*, like trusts, are organised to eliminate competition and raise home prices above the level which would be possible under competition. Here the tariff comes in. No English combination has yet been able to raise home prices above the level current in neutral markets. If it did, the article would be imported from abroad, and the price level would fall. But many of the German, Austrian, and other foreign *kartells* (notoriously the sugar syndicates previous to the Brussels convention) have made it their policy to sell at very low prices abroad that part of their stock for which they could not obtain monopoly prices in the home market. This can be done, because the home market is 'protected' by a high tariff wall. The price within the wall is almost always a little higher than the national or international price *plus* the duty.

The business of the *kartell* is not to direct and manage the process of manufacture, but to sell the products of the combination. For this purpose a pool or fund is frequently created out of the home profits in order to sell surplus products abroad at a loss. Thus the exports of a German *kartell* are bounty fed out of the excessive prices charged to German consumers. One extraordinary case quoted is that of coke, for which German consumers were at one time charged 17 marks per ton, while Austrian buyers got the same quality at 8 marks. Similarly in 1900 the wire *kartell's* price in Germany was 185 marks, and abroad 115 marks per ton. In the bad times of 1900–2, the nail syndicate sold at 250 marks per ton in Germany and at 140 marks abroad. There is no space to multiply examples, but enough has been said to show why the *kartells* are almost as unpopular in Germany as are the trusts in the United States. Outside these regular organisations—trusts, *kartells*, associated companies, or syndicates—there are also, of course, innumerable other arrangements, often of an informal or temporary character, by which capital seeks to extract monopoly profits from the consumer. Private agreements between railway companies in cases where amalgamation could not be legally carried out are known in Great Britain. Merchants and passengers by sea often find to their cost that apparently competing lines have entered into a shipping 'ring.' Buyers or sellers, especially speculators in particular markets, often find that they have been 'cornered.' But by whatever name these arrangements and associations go, they are all characterised by the same purpose—monopoly.

[See Steinmann-Bucher, *Wesen und Bedeutung der Gewerblichen Kartelle* (1898); Ely, *Monopolies and Trusts* (N. Y., 1900); Jenks, *The Trust Problem* (N. Y., 4th ed. 1903); the writer of the preceding article, F. W. Hirst, *Monopolies, Trusts, and Kartells* (1905); Levy, *Monopole, Kartelle, und Trusts* (1910; new ed. 1928).]

Assoilzie ('assoil,' 'absolve'), a Scots law term meaning to absolve from a claim, or acquit.

Assolant, ALFRED, French author, was born in 1827 at Aubusson, Creuse, and became a teacher in Paris. In 1852 he visited the United States, and on his return published some brilliant sketches, as *Scènes de la Vie des États-Unis* (1859). From his pen now came a long series of tales and novels, including *Brancas* (1859), *Marcomir*, *Gabrielle de Chênevert*, *Les Aventures du Capitaine Corcoran*, *François Buchamor*, *Pendragon* (1881). He was equally notable as a sarcastic and powerful journalist and political writer, bitterly assailing the empire and the opportunist republican government. He died in May 1886.

Assonance, in Prosody, is the correspondence of sound pronounced by a reiteration of the same accented vowel with different consonants, as in *nice* and *might*, *war* and *fall*, *mate* and *shape*, *feel* and *need*. It is a kind of imperfect rhyme, or rather a substitute for rhyme, and is especially common in Spanish poetry. All the old French poetry also was marked by assonance, not rhyme. 'The rule of assonance,' says Marsh, 'requires the repetition of the same vowels in the assonant words, from the last accented vowel inclusive. Thus *man* and *hat*, *nation* and *traitor*, *penitent* and *reticence*, are assonant couples of words of one, two, and three syllables respectively.' In Spanish verse the assonance is generally introduced only in alternate verses or the

second of each couplet. Assonant or vowel rhymes occur frequently in modern English poetry.

Assos, a ruined town on the Gulf of Edremid, from the still imposing remains of which the successful excavations, in 1881–83, of the American Institute of Archæology brought to light the agora, with senate-house and colonnade, a bath, theatre, gymnasium, statues of heroes, and seven Christian churches.

Assuan' (also *Aswan;* the ancient *Syene*) is the southernmost city of Egypt proper, on the right bank of the Nile, and beside the first or lowest cataract. Near are the islands of Philæ and Elephantine. On the left bank are catacombs. There are some remains of the ancient city. Near by are quarries of granite (the name—though not the rock—Syenite (q.v.) comes from Syene) from which huge obelisks and statues were cut to adorn the temples and palaces of ancient Egypt. Pop. (1927) 16,366. Assuan is capital of a district and headquarters of a commandant.

The great Nile irrigation system, commenced in 1898, includes a dam at Assuan and barrages at Esna, Assiut, and Zifta. Assuan dam, opened by the Duke of Connaught on 10th December 1902, was designed to raise the level of the Nile for 140 miles above the first cataract, its total length being 1¼ mile, the maximum height from the foundation about 130 feet, and the total weight of masonry over one million tons. The difference of level of the water above and below was 67 feet, navigation being provided for by a series of four locks, each 260 feet by 32 feet. The dam was pierced with 180 openings, 20 feet by 6 feet, capable of discharging 15,000 tons of water per second. In 1907 it was resolved to heighten and thicken the dam. On 23rd December 1912 the Khedive laid the last stone of the extension, which cost £1,520,000; £320,000 being allotted to expropriated villagers and to the Antiquities Department for research in the area to be submerged, which included Philæ (q.v.). The dam's storage capacity was increased from 980,000,000 to 2,420,000,000 cubic metres. The water-level was raised 23 feet, the masonry 16·4 feet. The enlarged dam brings over 6,000,000 acres within cultivation (2,500,000 acres thereof under summer crops in normal years). By drainage of the Delta, and by pumping in Upper Egypt, vast additional areas are being reclaimed; a dam on the White Nile near Gebel Auli, above Khartum, is proposed, to increase the storage for summer and provide against inundations; and regulation of the Nile at the Great Lakes may yet be undertaken. See EGYPT, IRRIGATION, NILE.

Assumpsit, an action wherein the plaintiff asserted that the defendant undertook (*assumpsit*) to do a certain act, and failed to fulfil his promise; in form an action for trespass, but really for recovery of damages for breach of a simple contract (a promise not under seal). Both in Britain and in most of the United States this and other common-law forms of action have been superseded by statute.

Assumption, or ASSUMPTION OF THE VIRGIN, a festival instituted as early as the 6th century both in the East and in the West. In the 3d century we first meet with a Gnostic tradition, that, after the death of Mary, her soul and body were taken up to heaven by Christ and his angels. That legend was condemned by Pope Gelasius (494 A.D.), but, through a series of successful forgeries, it was fathered on SS. John, Athanasius, Augustine, and others, and by 590 was accepted as true by Gregory of Tours. The festival is kept on the 15th of August (see MARY). The word assumption might be used of Enoch and of several saints, but is generally understood of Mary alone. The assumption in this sense has been made the subject of pictures by Titian, Correggio, Murillo, Rubens, and many other famous painters; and several minor orders, fraternities, and sisterhoods call themselves after the miracle—as the Augustinians of the Assumption and the Little Sisters of the Assumption.—For Assumption, the capital of Paraguay, named after the festival, see ASUNCION.

Assumptionists, or AUGUSTINIANS OF THE ASSUMPTION, a congregation founded at Nîmes in 1843 by Father Emmanuel d'Alzon, vicar-general of that diocese, were organised in 1847, and formally approved in 1864. Their main objects were to combat irreligion in Europe and schism in the East; and with these ends in view the brethren devoted themselves to catholic higher and secondary education, to the spread of truth by the press, to the conduct of pilgrimages, and to missionary work in the East. Their 'bonne presse,' especially its paper *La Croix*, was charged by the French government with hostility to the republic and with monarchical aims, and the congregation was suppressed within French territory in 1900. Many Assumptionists came to England, but some remained at home as secular priests. Their press was bought by a manufacturer of Lille, and is still zealously carried on. The Assumptionists follow the rule of St Augustine, and have the same privileges, breviary, and habit as the Augustinians. Father d'Alzon also established the 'Ladies of the Assumption,' who promote the education of the upper classes and the adoration of the blessed sacrament. One of his first disciples founded the 'Little Sisters of the Assumption,' who visit the sick poor in their own homes. Amongst Bulgarians, Greeks, and Armenians the Assumptionists employ the oriental rite (Greek or Slav).—An older congregation of French nuns, the 'Sisters of the Assumption,' founded in 1839, educates young girls.

Assur, or ASHUR, early capital of Assyria; also a name of the country itself and of its chief god. See ASSYRIA.

Assurance. See INSURANCE.

Assur-ban-i-pal, or SARDANAPALUS. See ASSYRIA.

Assur-nazir-pal. See ASSYRIA.

As'synt, LOCH, a beautiful fresh-water lake of South-west Sutherland, 6½ miles E. of Lochinver. Lying 215 feet above sea-level, it has an extreme length and breadth of 6¾ miles and ¾ mile. N. of it rises Quinag (2653 feet); E., Benmore Assynt (3273); S., Canisp (2779) and Suilven (2399).

Assyria (called *Assur* and *Asur* in the Assyrian inscriptions; *Athura* in the Persian) was the northernmost of the three great countries that occupied the Mesopotamian plain. It was bounded on the N. by the Niphates Mountains of Armenia; on the S. by Susiana and Babylonia; on the E. by Media; and on the W., according to some, by the Tigris, but more correctly by the watershed of the Euphrates, for many Assyrian ruins are found to the west of the Tigris. It was thus about 280 miles long from N. to S., and rather more than 150 broad from E. to W. This plain is diversified by mountain-chains on the north and east, and watered by the Tigris and its affluents, between two of which—the Zab rivers—lay the finest part of the country, called Adiabené. Its extraordinary fertility enabled it to support a large population. The high degree of prosperity and civilisation reached by its inhabitants in very early times is attested not only by ancient writers, but by the extensive ruins of mighty cities, by the canals and contrivances for irrigation, and by the numerous proofs—furnished by excavation—of acquaintance

with the arts and sciences. The ruins of many cities are grouped around Nineveh; while lower down, the Tigris exhibits an almost unbroken line of ruins from Tekrit to Bagdad. Under the Mohammedans this fine country is now almost a desert.

It received its name from its first capital, Asur, or Assur, now *Kalah Shergat*, on the east bank of the Tigris, between lat. 35° and 36°. The city seems to have been founded by the Mitannians, a people allied to the Hittites, and was governed by high-priests. The later capital, Nineveh, now *Kuyunjik*, opposite *Mosul*, originally grew up round a temple of the goddess Istar, and owed its importance to the fact that it was on the commercial high-road to the silver and copper mines of Cappadocia. Calah, now *Nimrud*, at the junction of the Tigris and Upper Zab (or Lycus), was founded about B.C. 1300, and for a time was the chief seat of government.

Productions.—Stone was plentiful, more especially a species of alabaster; while iron, copper, and lead were found in the neighbouring mountains. The hills were covered with pines, oaks, and planes; figs and olives grew in the plain. The vine had been introduced from Armenia. Wheat, barley, millet, hemp were cultivated. Animals were numerous, both wild—lions, panthers, bears, bulls, stags, gazelles, hares, &c.—and domesticated—cattle, goats, sheep, dogs, asses, horses, and camels.

History.—Before the decipherment of the inscriptions our knowledge of Assyrian history was dependent on a few Biblical notices and the legends to be found in classical writers. The Assyrian history of Ctesias of Cnidus (court-physician to Artaxerxes Mnemon, B.C. 405) is little more than the Greek form of a Persian romance, and the references to Assyrian history in his rival Herodotus are not much more trustworthy. Ninus and Semiramis, Ninyas and Sardanapalus, though an historical background may possibly lie behind them, are all alike legendary. Apart from the quotations from Abydenus and Berossus preserved in Greek Christian writers, classical antiquity has handed down to us little except myth and fable.

Chronology.—Assyrian chronology rests upon the so-called Eponym Canon—that is, lists of the successive *limmi*, or officials, who gave their names to the years in which they held office. As the date of the official year of one of them is fixed by a solar eclipse, we possess an exact register of time from B.C. 913 to 659, the period covered by the lists that have been preserved. The institution of reckoning time by the names of a successive series of officials went back to at least B.C. 2000. For the period before B.C. 913 we are dependent on the dates assigned in the later inscriptions to the reigns of earlier kings or high-priests: thus Sennacherib states that Tiglath-pileser I. was defeated by the Babylonians 418 years before his own conquest of Babylonia (B.C. 689), and that Shalmaneser I. lived about 600 years before himself. Other sources of chronology are the *Synchronous History of Assyria and Babylonia*, which gives an account of the relations between the two countries, and the *Babylonian Chronicle*, which in its later part throws much light upon Assyrian history.

Monumental History.—Assyrian history begins with the Mitannian high-priests of Asur, who, after the Semitic occupation of the country, made way for Semitic rulers. From Gen. x. 11 it would seem that the leader of the Semitic invaders was Nimrod, whose name, however, has not been found on the monuments. In any case the Assyrians of history were a body of military adventurers from Babylonia, who brought with them the language, laws, customs, and religion of their native land. The name of Nineveh may imply that some at least of them came from a city of similar name in Babylonia, where the goddess Istar was worshipped under the name of Nina. Up to the last Assyria remained a military state; whereas in Babylonia the population was mainly agricultural or commercial, and the government was largely theocratic in character, in Assyria the army was predominant, and its general was the ruler of the state. A result was the frequency of revolutions, which ended by placing a successful general on the throne. The whole nation seems to have been trained to arms, and the national deity was a war-god.

For several centuries, however, the high-priests of Asur were subjects of the Babylonian king. When the Babylonian dynasty of Khammu-rabi fell after an invasion of the country by the Hittites, the Assyrians succeeded in asserting their independence during the troublous period that followed. Their first king may have been Bel-kabkabu, who, according to Shalmaneser I. (B.C. 1300), lived 580 years before himself. From this time onward there were constant wars between Assyria and the mother-country, interrupted at times by treaties and even intermarriages, as when the Babylonian king married the daughter of Assur-uballit, king of Assyria, about B.C. 1400. The marriage proved disastrous to the Babylonian king, who was murdered. Assur-uballit, however, avenged his death, and placed his own great-grandson upon the Babylonian throne. Letters of his to the king of Egypt have been found at Tell el-Amarna.

Babylonia and the Hittites now combined against the growing power of Assyria, and the league was subsequently joined by Egypt and Mitanni. Mitanni (Mesopotamia), however, was compelled to submit to Assyrian rule, and the overthrow of the Hittite empire in the 13th century B.C. left Babylonia defenceless. Shalmaneser I. (B.C. 1300) carried his arms far to the north and west, reducing the Aramæan tribes to obedience, and made Calah his capital, while his son, Tukulti-Ninip I., captured Babylon, and for seven years reigned there as lord of the eastern world. A revolt finally forced him to retreat to Assyria, where he was murdered, and his dynasty came to an end a few years later in the person of Bel-kudur-uzur. His successor, Ninip-pileser, seems to have founded a new line of kings, the fifth of whom, Tiglath-pileser I., was one of the greatest of Assyrian conquerors (B.C. 1100). He extended the dominion of Assyria from the frontier of Elam to the Mediterranean, overran the mountainous region to the north, and boasted of having killed a dolphin in the western sea. At Arvad he received presents from the Pharaoh of Egypt, which included a crocodile and a hippopotamus. He enlarged the palace at Calah, and repaired the great temple of Anu and Hadad at Asur. Under his successors, however, the military strength of the empire decayed; the western conquests were lost, and the Aramæans blocked the road to the Euphrates. This period of decay is synchronous with the rise and rapid development of the Hebrew monarchy under David and Solomon.

With Assur-nazir-pal II. (B.C. 884–859) a new era of conquest commenced. Year after year the Assyrian army marched out of the capital in pursuit of booty and slaves. Mesopotamia was recovered, the Assyrian forces found their way to the Phœnician coast, and the mountaineers of the north-east as far as Lake Urumiyeh were compelled to pay tribute. Shalmaneser II., Assur-nazir-pal's son and successor (B.C. 858–824), whose annals are engraved on the Black Obelisk from *Nimrud*, now in the British Museum, continued the conquests of his father. Before he died Assyria was mistress of Western Asia. The merchants of Assyria, whose trade had formerly been chiefly with the north-west, now looked covetously on the commercial wealth of the Phœnician cities, and Shalmaneser,

accordingly, made every effort to possess himself of the Mediterranean coast. But the Syrians of Damascus stood in the way. Campaign after campaign was therefore directed against Ben-Hadad and Hazael, and in B.C. 854 the Syrians with their allies were defeated in a battle at Qarqar, on the Orontes. Among the allies was Ahab of Israel, who had contributed 2000 chariots and 10,000 foot-soldiers to the confederacy. Twelve years later (B.C. 842) Syria was again invaded, and Hazael was defeated on the heights of Shenir (or Hermon, Deut. iii. 9), with the loss of 1121 chariots. Shalmaneser then besieged Damascus, cutting down the trees which surrounded it, and after marching into the Hauran, returned to the coast, where he caused an inscription to be engraved at the mouth of the Nahr-el-Kelb, near Beyrout. Here he received tribute from Tyre, Sidon, and 'Jehu, the son of Omri.' The Israelites, who are pictured on the Black Obelisk, are said to have brought 'silver, gold, a bowl of gold, a cup of gold, golden goblets, golden pitchers, lead, a sceptre, and bdellium (?).' Shalmaneser's latter years were troubled by the rebellion of his son, which, however, was eventually suppressed.

His grandson, Hadad-nirari IV. (B.C. 810–782) resumed the work of subjugating the west. Damascus surrendered to his arms, and its treasures were carried to Assyria, and Hadad-nirari claims to have conquered 'Tyre, Sidon, the land of Omri, Edom, and the Philistines.' As Judah is not mentioned, it appears to be included in 'the land of Omri,' or Israel; according to 2 Kings, xiv. 13, Jerusalem had been taken by Jehoash, and Judah was now a dependency of Israel. Hadad-nirari must be 'the saviour' referred to in 2 Kings, xiii. 5.

In the year 763 B.C. the Assyrian eponym canon records the observation of a solar eclipse in the month Sivan, which is now identified as that of the 15th of June. This eclipse forms the pivot-point on which Assyrian chronology turns. The empire now began to display signs of weakness, and when Assur-nirari ascended the throne in 753 B.C. there were many indications of a spirit of revolt. This is indicated by the statements in the eponym canon. Arpad in Syria revolted, and for four years the army remained at home, owing no doubt to the disturbed state of the country. An attempt was then made to repress the revolts in Namri or Kurdistan, which apparently failed, for in the year 746 B.C. we have a revolt in Calah, which indicates a rebellion of the army, followed by the usurpation of the throne in 745 by Pulu or Pul, a Babylonian who assumed the Assyrian name of Tiglath-pileser IV. Like his early namesake, he proved the saviour of the nation, and at once instituted an entirely new system of government of the provinces of the empire. In former times it was conquest and spoil rather than annexation and annual revenue that formed the policy of the rulers of Assyria. Tiglath-pileser IV., however, introduced a new system into the government, that of centralisation. Conquered districts were now annexed, and became satrapies ruled by Assyrian officials, and responsible for a fixed yearly revenue to the central government. The leaders of the national party in these regions were removed to Assyria, and their place supplied by bands of colonists from other regions, as in the case of Samaria, Arpad, and Hamath. Another chief aim of the new sovereign was the control of the great commercial centres in Western Asia. Thus Carchemish and the cities of Phœnicia were objects of campaigns to secure the trade-route through Syria. In 742 B.C. Arpad revolted and was besieged for two years by the Assyrians, and its subsequent fall brought about the conquest of North Syria. Hamath, then in alliance with Azariah, king of Judah, was taken by storm, and the kings of Syria hastened to pay homage to the conqueror. Among the names of those who waited on him we find Menahem, king of Samaria, Rezin of Syria (Damascus), Hiram of Tyre, Pisiris of Carchemish. This was the campaign referred to in the Scriptures (2 Kings, xv. 19), when Menahem gave a thousand talents of silver to Pul, king of Assyria (B.C. 738). The successful war in Syria and Palestine was followed by campaigns in Armenia on the shores of Lake Van. The Assyrians next appear in Syria as the allies of Ahaz, called Yahukhazi or Jehoahaz by the Assyrian scribes. The result of this campaign was the siege of Damascus and the ravaging of the kingdoms east of Jordan. The fall of Damascus (B.C. 732) made Syria a province of the court of Nineveh, and the tribute-lists discovered by Sir Henry Layard at Nineveh show Carchemish, Damascus, Arpad, Arvad, Hamath, Tyre, Sidon, and Samaria as contributing a regular sum to the national revenue. Having reduced the west to submission, the Assyrian king now attacked Chaldea, and after a severe war, commencing in 731 B.C., he defeated and slew Ukin-ziru, the Kinziros of the Canon of Ptolemy, and was proclaimed king of Babylon in 729 B.C.

This important reign ended abruptly in 727 B.C., and a military commander, Shalmaneser IV., seized the throne. He made an ineffectual attempt to capture Tyre, and after imprisoning the king of Israel, Hoshea, who had attempted to revolt, he laid siege to Samaria (B.C. 725). In B.C. 722 he died, or was murdered, and another usurping general, Sargon, was crowned king. Sargon continued the war in Syria, and in 722 B.C. captured Samaria, carrying away 27,280 of the leading inhabitants, and placing them in the province of Gozan, near the Khabour, and in Media. The latter days of the reign of Tiglath-pileser IV. evidently had been marked by a general revolt of the provinces, which Sargon had to reconquer; and in the battle of Raphia on the borders of Egypt, which terminated the war, he checked the advance of the Egyptians under Sabako. In 717 B.C. the Hittite capital, Carchemish, fell, and produced the rich spoil of 'eleven talents, thirty manehs of gold, and two thousand one hundred talents of silver.' All this time the intrigues of Merodach-baladan III. in Chaldea were causing trouble, but the disturbed state of the other provinces still kept Sargon from the object he most desired—the conquest of Babylon. In order to delay the attack, Merodach-baladan sent his embassy to Hezekiah, and raised a revolt in Syria, in which Phœnicia, Moab, Edom, and Philistia, supported by the Egyptians, took part. Sargon besieged Jerusalem and burned Ashdod (Isaiah, xx. 1). Having quelled the revolt, Sargon invaded Babylonia, and after a terrible campaign captured the capital, Merodach-baladan taking refuge in flight, and was proclaimed king 710 B.C. Tablets dated in his reign as king of Babylon are preserved in the British Museum. Sargon built for himself a magnificent palace called *Dur Sargon*, 'Fort Sargon,' marked by the ruins at Khorsabad, about 15 miles from Nineveh. This palace was explored by M. Botta for the French government, and the fine sculptures from it form one of the treasures of the Louvre. The bas-reliefs, sculptured figures, and architectural decorations of this palace show a new departure in Assyrian art, and indicate foreign influence. Sargon was killed during a revolt of the soldiers in the new palace on the 12th day of the month Ab (July) 705 B.C., when his son, Sennacherib, succeeded him. The Babylonian revolt on the death of Sargon led to the return of Merodach-baladan, but nine months later he was defeated by the Assyrians in the battle of Kisu.

At the same time a revolt broke out in Philistia, and the people of Ekron, having deposed the Assyrian nominee Padi, sent him for security in chains to Hezekiah, king of Jerusalem, who placed him in prison. This brought on the Jewish king the vengeance of Sennacherib. Having conquered Phœnicia, he marched against Ekron, where he punished the chief priests and Philistine lords who had broken their oaths to Assyria. Taharka of Ethiopia, called Tirhakah in the old Testament (2 Kings, xix. 9), who had marched from Egypt to the help of Hezekiah, was defeated at Eltekeh, and Sennacherib proceeded to ravage Judæa, capturing forty-six cities, chiefly in the hill-country, and then advanced to Jerusalem. Here he states he shut Hezekiah up in the capital 'like a bird in a cage.' There is no indication in the inscriptions how long this siege lasted, and the meagre account of this event in the campaign, and the remarkably abrupt termination of the narrative, seem to indicate that the siege terminated in a disaster to the Assyrian arms. The tribute paid by the king was sent by an envoy to Nineveh, not paid on the surrender of the city; and this, together with the fact that Sennacherib never again entered Palestine, goes to confirm the statements of the Hebrew writers.

Sennacherib's endeavours to govern Babylonia were unfortunate. His viceroys were driven out of the country, which revolted against him time after time with the help of Elam. But the battle

Sennacherib at the Head of his Army. (Height, 38 inches; in British Museum.)

of Khalulê in B.C. 691 disheartened the allies, and after two more years of struggle Babylon was taken by storm in B.C. 689 and razed to the ground. The deed excited horror throughout Western Asia, and the Babylonians saw in the subsequent murder of its perpetrator the vengeance of their god Merodach. The Assyrian forces were also engaged in Cilicia, where a revolt led to the capture and rebuilding of Tarsus and an engagement between the Assyrians and the Ionian Greeks.

The statement as to the murder of Sennacherib by his sons meets with confirmation from the inscriptions. In the Babylonian canon we are told that on the 20th of the month Tebet (December) 681 B.C. the king was slain by one of his elder sons, who was perhaps jealous of the favour shown to his younger brother Esar-haddon, who was at the time serving with the army. Seven weeks later Esar-haddon overthrew his brothers, together with their ally Rusas II., king of Armenia, at Malatiyeh in Cappadocia, entered Nineveh in triumph, and placed himself upon the throne. Though the most active general of his father, Esar-haddon was far more than a mere warrior. He possessed great political tact, and at once inaugurated a new policy with regard to Babylon. He divided the court between Babylon and Nineveh, residing at the former place during the winter, at the latter during the summer months. It was during one of these periods of the winter court at Babylon that Manasseh was brought there prisoner (2 Chron. xxxiii. 11). A son of Merodach-baladan had attempted during the period of anarchy to seize the throne of Babylon, but being defeated, he fled to Elam, where he was put to death by the Elamite king, who wished to preserve the friendship of the king of Assyria. In 675 the Assyrian king commenced one of the most important wars in the whole period of Assyrian history—namely, that which resulted in the subjugation of the powerful kingdom of Egypt to the Assyrians, and left most of the ancient world under one rule for twenty years. After the war had been waged with varied success for more than three years, the Assyrian king made a great effort to terminate it. A very powerful army left Nineveh the first day of the year, and took the road to Egypt. The march occupied three months, and after the Assyrians had reached the Egyptian strongholds a series of battles was fought, resulting in the retreat of the Egyptians to Memphis, which was captured by the Assyrians on the 22d of Tammuz (June), whereupon the Ethiopian king of Egypt, Taharka, fled up the Nile. Esar-haddon returned by way of the coast of Syria, receiving *en route* the tributes of the Phœnician and Greek kings of Cyprus, and the Philistine, Moabite, and Israelite rulers. In commemoration of this successful campaign, the king had his statue carved on the rocks at Baal-Rasi (Nahr-el-Kelb). Before leaving Egypt the Assyrian king divided the newly conquered land into twenty satrapies, ruled by prefects subject to the court of Nineveh.

The Egyptians did not long remain quiet after the departure of the main body of the Assyrian army; for Taharka returned from the Upper Nile, and the Assyrian king had once more to prepare for a campaign in the Nile Valley. He had already

solemnly appointed his son, Assur-bani-pal, his successor on the 12th Iyyar (April) 669. Six months later, during the campaign, on the 12th Marchesvan (October), Esar-haddon died while on the march to Egypt. Assur-bani-pal had all the ambition but lacked the military genius of his father. He was a generous patron of art and letters, and his reign was the culminating point of Assyrian splendour. He continued the Egyptian war, and drove Taharka from Memphis to Thebes, which city he captured and stripped of its treasures. Phœnicia was next invaded, and Tyre captured, after a siege lasting some months. Campaigns in Elam and in Northern Arabia next occupied the army. The empire was now shaken by one of the most serious revolts ever raised against the government. Acting, probably, on the advice of his father, Assur-bani-pal had appointed his brother, Samas-sum-yukin (the Saosduchinos of the Canon of Ptolemy), viceroy of Babylon, who, taking advantage of the absence of the Assyrian armies in various lands, rose in revolt, aided by the Elamites, Arabs, and by the Egyptians under Psammetichus. The revolt lasted more than five years, but at last Babylon, Borsippa, Sippara, and Cuthah were besieged and taken, and fire, sword, and pestilence spread through the land. The rebellious prince burned himself in his palace with many of his followers.

This revolt, however, shook the foundations of the empire, and soon the vast fabric began to totter. Egypt declared her independence, Syria was in revolt, Elam and the north-eastern provinces refused tribute, and eventually, after the death of Assur-bani-pal, the viceroy of Babylonia, Nabopolassar, father of Nebuchadrezzar, openly threw off all semblance of his allegiance and declared himself king. Assur-etil-ili-yukinni succeeded his father, Assur-bani-pal, 625 B.C. He rebuilt the palace of Calah, and bricks bearing his inscriptions have been found there. The last Assyrian king was Sin-sar-iskun, or Saracos, who was overthrown and Nineveh destroyed by Cyaxares of Ecbatana in B.C. 605.

Assyria became a Median province, and subsequently part of the Persian empire. In 331 B.C., at Gaugamela, near Arbela, east of the Tigris, Alexander defeated Darius Codomannus, the last of the Achæmenian Persian kings. In 312 B.C. the country became part of the kingdom of the Seleucidæ, whose capital was Seleucia, on the Tigris. On the rise of the Parthian power it passed under Parthian rule, and was more than once temporarily in the possession of the Romans. When the Persian monarchy of the Sassanids was destroyed by the successors of Mohammed, Assyria became subject to the Khalifs. From 1638 till the Great War it formed part of the Turkish empire.

Government.—The government during the early and middle empires was a pure despotism and rule by force of conquest, held together by the obligations of tribute and homage; but no centralisation existed. In the reign of Tiglath-pileser IV., an extensive system of central government with the accompaniment of bureaucracy was introduced. In conquered lands the native rulers were either removed and replaced by Assyrian governors, or a resident was placed beside them. Tributary cities were ruled by prefects (*pikhate*) and sub-prefects. Revenue was levied by collectors from all towns and districts, and an annual present from the native princes. In home government the Assyrians modelled their system on that of Babylonia. Taxes were levied on all produce from towns and villages, and tithes for the temple revenues. Special taxes were levied for the army, the river-flotilla, and the maintenance of the royal roadways. Justice was administered by appointed judges, the courts being held in the temples or in the city gate, with the right of direct appeal to the king. The king had absolute power over life and death, and offenders were treated with the greatest cruelty; impalement, decapitation, mutilation, and burning by fire were the punishments inflicted. The king was feudal lord of all land, and could grant or take away any estates except those of the temples. Public works were carried out by *corvée* (forced bands of labourers) and captive-labour, provisions for the workmen being furnished by the state.

Religion. — The religion of Assyria was of Babylonian origin, with an important exception. Assyria was a military monarchy, and the king was at the head of the state. Whereas in Babylonia the priest took precedence of the king, in Assyria the king was himself the high-priest. The supreme deity of Assyria, accordingly, was a warrior-god, and, like the king, a leader in war. Originally he bore the title of Asiru, or 'Leader,' his female counterpart being Asirat, the Asherah of Canaan. Asiru, however, subsequently became confounded with the defeated city of Asur, or Assur, and so came to represent the state. One result of this was that he ceased to be regarded as having a wife or son, and thus occupied a position similar to that of the national God of the Hebrews;

The Guardian Spirit or S'edu.

another result was that the enemies of Assyria were enemies also of Assur, and were punished consequently as heretics. The other deities of Assyria were borrowed from Babylonia, including Merodach, the paternal god of Babylon. But their worship in Assyria seems to have been chiefly confined to the literary classes, with the exception of the goddess Istar, who had temples and oracles at Nineveh and Arbela, and was adored there as the goddess of war, rather than of love, as was the case in Babylonia. The architecture of the temples and the religious ceremonies practised in Assyria, as well as the theological beliefs of the people, came from Babylonia, together with the religious literature connected with them. For Assyrian religion, therefore, apart from the cult of Assur, the article on BABYLONIA must be consulted.

Ethnology.—The Assyrians were a branch of the Semitic family of nations, and therefore members of the same division of the human race as the Syrians, the Phœnicians with their colonies, the Jews, and the modern Arabians. Long prior to the 30th century B.C., Semitism, as a distinct ethnic element, appears to have established itself in Babylonia. There the primitive population, known as Sumerian, belonged to a wholly different type, and were characterised by want of beard, flattish nose, and an agglutinative language. In Assyria, on the other hand, the Semites were preceded by the Mitannians, a race which had come from the north and was probably related to the Hittites and Proto-Armenians.

In language, Assyrian is allied to the northern branch of the Semitic family. The vocabulary has a close affinity with Hebrew and Phœnician, while in the full development of the verbal conjugation, the use of numeration, and its richness of synonyms, it approaches nearer to the Arabic. Phonetically it has been much affected by Sumerian, and has lost many characteristically Semitic sounds. The predominant features of the Assyrian ethnic type are Semitic, but modified by intermixture with Sumerian and other elements.

Script.—The script used by the Assyrians was the cuneiform or wedge-headed, so called from the resemblance of the lines of which the characters consist to wedges. This was due to their having been impressed by a stylus upon moist clay, the ordinary writing material of Assyro-Babylonian civilisation. The script was the invention of the Sumerians, the primitive population of Babylonia, and was originally a system of pictorial writing, the pictures representing both objects, like 'a man' or 'the sun,' and ideas like that of 'going.' The latter were expressed symbolically, the idea of 'walking,' for instance, being denoted by the picture of a foot. In time some of the pictures came to be used phonetically, the pronunciation of the words denoted by them being detached from the words and employed to represent sounds only. Thus the character which denotes *du*, 'to go,' might be used merely to represent the sound *du*. When Babylonia was occupied by the Semites, they took over the script of the Sumerians, adding fresh characters to it and largely increasing its phonetic use. The Sumerian words became phonetic values; *utu*, 'the sun,' for example, passing into the phonetic value *ut* or *ud*, though the characters still continued to be employed ideographically—that is to say, to denote objects and ideas as well as sounds. One result of this was that the same character could be used both ideographically and phonetically; another is the existence of *polyphony*, every character having more than one phonetic value. In the earlier days of cuneiform decipherment, this latter peculiarity proved a great obstacle to progress. When the characters were used as ideographs in Semitic Babylonian or Assyrian, the pronunciation given was naturally that of the Semitic words they represented. Meanwhile the characters had ceased to be pictorial, and had developed into the cursive hand which we call cuneiform, and which bears the same relation to the older pictorial script that the Egyptian demotic does to the hieroglyphics. When the custom of writing upon clay with a stylus was introduced, curved lines necessarily became straight, and the lines themselves assumed a wedge-like form. A change, moreover, took place in the position of the characters themselves. The pictorial characters had been written in vertical columns, like Chinese; when they became cursive, the tablet on which they were inscribed was held sideways in the left hand, so that the characters were turned half-way round and the writing ran from left to right. This happened centuries before 3000 B.C. From Babylonia and Assyria the cuneiform script was carried, along with the other elements of Babylonian civilisation, to all parts of Western Asia. It was used in Asia Minor as early as 2500 B.C., and in Syria and Palestine about the same time. A special form of it was devised at a later date for Armenia, while an alphabet was formed out of it by the Persian kings. Its use in Elam was earlier than its use in Assyria.

It was only very gradually superseded by the simpler Phœnician alphabet, which first makes its appearance in the 10th or 9th century B.C. About the same time Aramaic became the language of trade and diplomacy, so that from the age of Tiglath-pileser IV. downwards we find even at Nineveh Aramaic dockets in the letters of the 'Phœnician' alphabet attached to cuneiform commercial documents. But in Babylonia the cuneiform system of writing survived almost to the Christian era, and tablets have been found giving transcriptions in Greek letters of Sumerian and Semitic Babylonian words which are written in cuneiform.

Decipherment of the Inscriptions.—The Persian cuneiform texts, which are written in an alphabet, and in which the words are divided from one another, were the first to be deciphered. Darius I. and his immediate successors caused inscriptions to be written in three languages, Persian, Babylonian, and Elamite, and in three forms of cuneiform script. Grotefend, in 1802, identified the names of Darius and Xerxes in the Persian transcripts, and thus obtained the beginnings of an alphabet. Other scholars took up the clue, and by the labours of Rask, Burnouf, Lassen, and Rawlinson the Persian cuneiform alphabet and language were finally made out. The Babylonian and Elamite transcripts were next attacked by Rawlinson, Hincks, Norris, and others, the proper names furnishing a clue to the phonetic values of the characters. Babylonian proved to be a Semitic language, allied to Hebrew, while Elamite was agglutinative. Owing to the difficulties of the Assyro-Babylonian script, however, the decipherment of the Babylonian texts and of the newly found Assyrian inscriptions, which were discovered to be in the same language, was but slow; but the decipherers were aided by the native syllabaries and dictionaries disinterred by Layard in the ruins of Kuyunjik. The discovery of the Sumerian language of early Babylonia next followed, the interpretation of which was given by the native grammars, vocabularies, and translations of Sumerian texts into Semitic Babylonian. The Armenian cuneiform inscriptions were deciphered by Sayce, those of Susa and other parts of Elam principally by Scheil. The recently discovered Hittite cuneiform texts still await an interpreter.

Literature and Civilisation.—One of the most important results of excavation was the discovery, in the palace of Assur-bani-pal at Nineveh, of a large library consisting of many thousands of tablets, large numbers of which are now stored in the British Museum. This library, perhaps, owed its origin to the keen political insight of Esar-haddon, but was completed by his son, Assur-bani-pal, whose name most of the tablets bear. In the colophon or docket attached to each tablet the king says: 'The wise things of Nebo, all there was on tablets I wrote, I engraved, I explained, and, for the inspection of my people, in my palace I placed.' Most of the tablets were copied from more ancient originals in the temple libraries of Chaldea, each being stated to be 'like its old copy,' or 'like the ancient tablets of Sumir and Akkad.' That such was the case is now demonstrated by the discovery of duplicate copies in the libraries of Babylonian cities. The library was evidently founded to prevent the youth of Assyria from going to study at Babylon or Borsippa, where they would be subjected to dangerous political influences. Its educational character is shown by the discovery of the syllabaries, dictionaries, and text-books which exist in it. They constituted the class-books of the students in Nineveh, and have been to a large extent the medium by which the decipherers have learned the older languages of Chaldea. They include works on mathematics, tables of square and cube roots, as well as lists of plants, metals, and precious stones, animals and birds. The geographical works appear to be limited to lists of countries with their products, such as 'Lebanon cedar,' 'Elam horses,' 'Cilicia tin and

silver,' and 'Arabia camels.' The part of the library, however, which has been most prolific in discoveries has been that of the poetic and mythological literature. In 1872 George Smith, of the British Museum, discovered a series of poetic legends relating to the great Chaldean hero, Gilgames, the eleventh tablet of which contains a legend of the Deluge, very closely resembling the Hebrew account. The flood, we are told, was sent as a punishment for sin; the builder of the ark, called Utu-napisti, gathered into the vessel all his male and female servants, and family, and all the beasts of the field. The preparation of the ark occupies seven days; the rain lasts seven days; seven days are occupied in reaching Mount Nizir, on which the ark rested. Here a sacrifice is offered, and the gods, smelling the sweet savour, gather about the altar, and by the intercession of Ea a covenant is made between man and the gods, and sealed by the appearance of the rainbow, which is called the vari-coloured necklace of Istar. The resemblances are very striking; but there are also differences, especially local features, which show that the traditions are not copied from one another, but probably have a common origin in an older tradition. The discovery of this epic was followed by the discovery of an important series of cosmogonic legends. The close resemblance which they present to the Hebrew Genesis story is well illustrated by the beginning of the first legend, which may be thus translated: 'When the heavens above were unnamed and below on earth a name was not recorded, the primæval ocean was the father of them; the chaotic sea was the mother of them all. Their waters were joined in one. The cornfield was not grown (and) no reed was seen. When as yet the gods had not come forth any of them. By name they were not called. Order did not exist,' &c. The resemblance of this to the first chapter of Genesis is remarkable. Many psalms, hymns, and prayers have also been preserved.

Antiquities, &c.—The excavations carried out by Botta, Layard, Rawlinson, George Smith, Rassam, and King at Khorsabad, Kuyunjik, and Nimrud, as well as by the Germans at Kalah Shergat, have led to many very interesting discoveries. The palaces and buildings that have been laid open are full of sculptures, and numerous historical inscriptions have been found in them. Among the most remarkable monuments now in the British Museum are two winged human-headed lions, 12 feet high, and as many in length; winged human-headed bulls of the same dimensions as the lions; winged sphinxes; and the famous obelisk of black marble, from *Nimrud*, sculptured on the four sides. The bas-reliefs are very numerous, exhibiting especially war and hunting. The march, the onset, the pursuit, the siege, the passage of rivers, the submission and treatment of captives, secretaries noting the number of heads taken in battle, and the amount of spoil; the chase of the lion, of the antelope, of the wild ass, and other animals—such are the favourite subjects of the Assyrian sculptor. Nor are they treated in the conventional style of Egypt, but in a manner which, for grace, spirit, correctness, and delicacy of execution, excels everything else known in Asiatic art. The artists sometimes follow modes of representation different from ours; for instance, a bull has five legs given him, in order that from all points of view he may be seen with four; a ladder stands edgeways against a side wall, to show it is not a pole. But a truthful impression is always aimed at, and it is this that gives these sculptures their value. The labour bestowed on the careful finish of a priest's dress, and on the tasteful decoration of an article of furniture, proves them to be the work of an ingenious and painstaking people. From the bas-reliefs we learn little about the private life of the Assyrians, but there are a few which represent the foddering of cattle, women riding on mules, &c.

It is natural to expect that Nineveh—a wealthy and luxurious city—imported many of the products of other countries, yet the manufactured goods would mainly be of home production. The jars, bronzes, glass bottles, carved ornaments in ivory and mother-of-pearl, engraved gems, bells, ear-rings, arms, and utensils are of excellent workmanship. The ornaments especially are in good taste, and evince no inconsiderable skill in the working of metals. Transparent glass was not unknown, nor the use of the lens as a magnifier. The Assyrians knew the principle of the arch, the use of the lever and roller, and the construction of aqueducts and drains. In the arts of peace they appear to have been not inferior to any ancient nation; while their conquests and the long duration of their empire suffice to prove their capacity for war.

For the archæology, see the books by Botta, Layard, Oppert, George Smith, and Perrot and Chipiez. For the history, see Rawlinson, *The Five Great Monarchies of the Ancient Eastern World* (4 vols. 1862–67); Oppert, *Histoire des Empires de Chaldée et d'Assyrie* (1865); Lenormant, *Manuel d'Histoire ancienne de l'Orient* (3 vols. 1869); Maspero, *Dawn of Civilisation, Struggle of the Nations*, and *Passing of the Empires*. For the language, see the grammars of Sayce, Delitzsch, King, and Pinches, and the dictionaries of E. Norris (1868–72), Delitzsch (1887), and Muss-Arnolt (1894 *et seq.*). For the religion, see Tiele's comparative *History of Religion* (1884–88); Sayce's *Hibbert Lectures* (1887), and his *Babylonians and Assyrians* (1900); R. W. Rogers's *Babylon and Assyria* (1901). See further Bezold's catalogue of cuneiform inscriptions in the British Museum (5 vols. 1901), and R. F. Harper's *Assyrian and Babylonian Letters* (1901 *et seq.*). And see the books cited at BABYLONIA.

As'tacus. See CRAYFISH and LOBSTER.

Astar'té, the Greek and Roman form of the name of a goddess worshipped by the Canaanites, Hebrews, and Phœnicians. She may have been a primitive Semitic deity, but more probably is a form of the Babylonian goddess Ishtar, who is mentioned in Babylonian inscriptions much earlier than any mention is to be found of Astarte. Her worship extended wherever Phœnician colonies were founded. The general notion symbolised in her attributes was that of productive power, as that of Baal was generative power. Hence, as the sun is the great symbol of the latter, the moon is of the former; and consequently we find the moon identified with Astarte, and the goddess represented horned like the crescent moon. By others she is supposed to be symbolised by the planet Venus, as was also the Greek Aphrodite. Astarte was the object of a sensual nature-worship, attended by many licentious rites and wild orgies. She was also goddess of maternity and fertility, as well as a war-goddess. Her worship spread to Israel after the conquest of Canaan. She was pre-eminently the city-goddess of Sidon; and her cult was carried by the Phœnicians to the Greeks and the Romans, and by Roman soldiers over the Roman empire, even as far as Corbridge. Prostitution as a religious rite in her service is known to have existed in Babylonia, Syria, Arabia, Carthage, Cyprus, Sicily, and probably amongst the Hebrews and Phœnicians. Amongst many peoples of a lower culture antenuptial unchastity, so far from being felt to be immoral, is customary and normal. For the custom a reason and a justification comes, as time goes on, to be required; and the reason found is that the custom, being immemorial, is divine, and is required by a divinity. This deity, like all other deities originally nameless, eventually acquired a name, Ishtar, or Astarte; and the custom became a

religious rite in her service. Then, with the growth of civilisation, the custom itself tends to become more and more offensive, and gradually to be restricted. Thus, though in Lydia, according to Herodotus, the common people maintained the primitive custom, in Babylonia and in Cyprus a single act of compliance served to release the woman from the degrading practice. Some of the legends of Babylonia make Astarte daughter of Sin, the moon-god, the Accadian Agu or Acu; but others place her among the older gods, making her daughter of Anu, the sky. Considered as the evening star, she was known as Ishtar of Erech; as the morning star, she was identified with Anunit or Anat, the goddess of Accad. With the Accadians she had a separate and independent existence as a divinity, though she came to be considered by the Semites as but the consort and shadow of the god. She presided over love and war, as well as the chase. She was invoked as 'the queen of heaven,' and 'the queen of all the gods.' Her chief temples were at Erech, Nineveh, and Arbela. Carried through the Semitic world, she was identified with the sun-god Chemosh in Moab, became the Ashtoreth of the Canaanites, and appears in a somewhat different form as the Aphrodite of the Greeks, and the Artemis *polymastos* of Ephesus. One of the most popular of Babylonian myths told how Ishtar had wedded the young and beautiful sun-god Tammuz, the 'only begotten,' and had descended into Hades in search of him when he had been slain by the boar's tusk of winter. The month of August was called by the Accadians 'the month of the errand of Ishtar;' while June was 'the month of Tammuz' of the Semites. This 'abomination' could be seen within the very precincts of the temple at Jerusalem (see Ezekiel viii. 14).

See in this work the articles ASSYRIA, BABYLONIA, PHŒNICIA, EGYPT, ADONIS, APHRODITE, BAAL, ISIS; Langdon's *Tammuz and Ishtar* (1914); and the relevant articles in Hastings's *Encyclopædia of Religion and Ethics* (1908 *et seq.*).

Astarte, a genus of Lamellibranch—i.e. bivalve—Molluscs, the type of a family, Astartidæ, now represented by a relatively small number of forms in northern seas; but in former ages—e.g. the Lias period—it was widely distributed and represented by numerous species.

Astatic (from the Greek *astatos*, 'unstable') is a term in physics which means 'having no tendency to take a definite or fixed position,' or 'without polarity.' It is used most frequently of a magnetic needle so arranged as to be unaffected by the earth's magnetism. This is managed by taking two magnetic needles, as nearly of the same intensity as possible, and placing them parallel to one another, with their poles in opposite directions. They thus neutralise one another, so as to be unaffected by the earth's magnetism, though they remain sensitive to an electric current, as in the astatic galvanometer.

Astatki, a Russian name for the solid residue after distillation of petroleum, first used in Russia as liquid fuel for locomotives and steamers.

As'ter, a genus of the family Compositæ, sub-family Tubulifloræ, with many herbaceous and shrubby species, chiefly perennial, of which three-fourths are indigenous to North America, the remainder sparingly distributed over Europe and Northern Asia. One species only, *A. tripolium*, the Sea Starwort, is a native of Britain. It is common in salt marshes. A number of perennial species are in cultivation as garden-flowers, of which the New-England Aster (*A. novæ angliæ*) and the Michaelmas Daisy (*A. tradescanti*), both natives of North America, are perhaps the most common, and, with some of the other species, are prized as among the comparatively few flowers to be seen at that dull season when autumn is giving place to winter. But the best known and most valued of all the asters is the China Aster—*A.* (*Callistephus*) *sinensis*—a summer annual, of which many varieties are in cultivation, and new ones are continually introduced. It was brought from China to France by a missionary in the 18th century, but has since been much improved and varied by culture, and all its florets have been rendered ligulate. The varieties exhibit great diversities of form and colour. The plant delights in a rich free soil. In the northern parts of Britain, the seed is generally sown in April in a hot-bed, or in pots under a frame, and the young asters are planted out in the open air in May. They flower from July to the end of autumn, and contribute much to the liveliness of the flower-garden.

Asterabad'. See ASTRABAD.

Aste'ria, a variety of Sapphire (q.v.).

Aste'rias and **Asteri'adæ.** See STAR-FISH.

Asterisk (Gr., 'a little star'), a sign or symbol (*) used in writing and printing, as a reference to a note at the bottom or on the margin of the page. The obelisk, or dagger (†), and many other marks, are similarly employed; but when there are several references on the same page, it is now common to use the numerals 1, 2, 3, &c. The asterisk often marks the omission of words or sentences, or it distinguishes words as conjectural or obscure, or it may be used merely as a typographical mark for any specified purpose.

Asteroids. See PLANETS.

Asterol'epis, a genus of the buckler-headed Ostracodermi, formerly considered a primitive type of ganoid fishes, but now constituting, with the Cyclostomata, a class by themselves—Agnatha. Asterolepis, which closely resembled Pterichthys (q.v.), occurs in the upper Old Red Sandstone; but the name has been erroneously applied to the remains of a large buckler-headed ganoid fish known as Homosteus—of common occurrence in the lower Old Red Sandstone of Scotland and Russia.

Asteroph'yllites (Gr. *astēr*, 'a star,' and *phyllon*, 'a leaf'), a general name, under which are included some abundant fossil plants of the Coal-measures. The forms so designated are the fluted stems of Calamites (q.v.) (*Equisetaceæ*), with slender branches springing from the joints, and bearing whorls of narrow-pointed leaves.

Asthma (Gr.) is a disease characterised by the occurrence of paroxysms, in which the breathing, previously natural, becomes difficult, and is accompanied by wheezing and a distressing sense of tightness in the chest. Asthma frequently appears at first after some inflammatory affection of the respiratory mucous membrane, but often without any such cause. It is sometimes a result of healed tuberculosis of the lung in which the scar tissue acts as an irritating focus. It may begin at any age, but most often before ten. It is often clearly hereditary, affecting several members of the same family; and it may occur in families with a tendency to nervous diseases—e.g. epilepsy. The paroxysms are often preceded by premonitory symptoms—in some by great drowsiness, in others by extreme wakefulness and unusual mental activity and buoyancy of spirits. The difficulty of breathing may become permanent to a slight extent, with severer paroxysms at intervals.

The spasms may occur at any hour, but least often in the forenoon, most commonly between two and four in the morning. The causes inducing an attack vary greatly. In some asthma only occurs with bronchitis, or with disorder of the stomach;

in some it is brought on by particular odours, or articles of food; in many locality exerts most influence—e.g. they may suffer little in a smoky town, much in the country; or the reverse.

The asthmatic paroxysm occurs somewhat as follows: The patient goes to bed and sleeps two or three hours, becomes distressed in his breathing, and begins to wheeze. He awakes, changes his position, falls asleep again and again, and the fight between asthma and sleep may go on, till the increased suffering does not allow the patient longer to forget himself for a moment; he becomes wide awake, sits up in bed, throws himself forward, plants his elbows on his knees, and labours for breath with fixed head and elevated shoulders. If the spasm is protracted, the oxygenation of his blood is imperfectly performed, owing to the scanty supply of air, and his extremities get cold and blue, but at the same time the violent muscular efforts at respiration—in which all the extraordinary muscles of Respiration (q.v.) are called into action—cover him with sweat. The pulse is always small. The chest is fully expanded during the paroxysm, but as it does not relax much there is little interchange of air. Alarming, however, as the attacks are, even to an onlooker, they are almost never fatal.

The symptoms of asthma are probably produced by spasmodic contraction of the muscular fibres surrounding the smaller bronchial tubes (see RESPIRATION); but they may be caused, at least in some cases, by temporary swelling of the bronchial mucous membrane, analogous to Nettle-rash (q.v.) on the skin.

During the occurrence of a paroxysm, the patient's clothes should be loosened, and he should be placed in such a position as will best assist him in his effort to breathe; to this his own sensations will generally guide him. The number of remedies recommended and sometimes useful during the attack is itself a testimony to their uncertainty. A few of the most valuable are antimony or ipecacuanha in emetic doses; very strong coffee; nitroglycerine in small doses; chloroform, transient in its effects, and to be used with caution; inhalations of oxygen; tobacco, stramonium, or lobelia smoked in the usual way, with inhalation of the smoke; blotting-paper impregnated with saltpetre and burnt; and as a preventive of a threatened attack a mixture containing belladonna, nitrite of soda, bromide, and iodide of potassium.

A sufferer from asthma must avoid all causes which he finds apt to induce an attack; must attend carefully to his general health, and especially his digestive system; and may obtain much benefit from tonic and anti-spasmodic medicines. The selection of a suitable locality for residence procures for many sufferers relief or immunity. When asthma begins very early in life, it often passes off at or before maturity.

Asti (*Asta Pompeia*), a city of Piedmont, in the province of Alessandria, lies on the left bank of the Tanaro, 35 miles ESE. of Turin by rail. Pop. (1921) 78,278. It is a large town, with walls considerably dilapidated, and the streets generally very narrow and irregular. It has a large Gothic cathedral, which was completed about 1348, and a royal college. There is carried on a considerable trade in silk and woollen fabrics, hats, leather, and agricultural produce. The *vino d'Asti*, a kind of Muscatel (q.v.), is highly esteemed. The town is of high antiquity, having been famous for its pottery before its capture by the Gauls in 400 B.C. On the occasion of its being again taken and destroyed in an irruption of the Gauls, it was rebuilt by Pompey, and received the name of Asta Pompeia. In the middle ages, Asti was one of the most powerful republics of Upper Italy. It was captured and burnt by the Emperor Frederick I. in 1155, and, after a series of vicissitudes, came into the possession of the Visconti of Milan; by them it was ceded to the French, in whose hands it remained till the middle of the 16th century, when the Dukes of Savoy acquired it. Alfieri was born here, 1749.

Astigmatism (from Gr. *a-*, 'not;' *stigma*, 'a point'), a defective condition of the eye, in which rays proceeding to the eye from one point are *not* correctly brought to a focus at *one point*. In *regular* astigmatism (a congenital malformation), the curvature of the cornea is unequal in different meridians, those of greatest and least curvature being at right angles to each other. A spot of light is seen as a small oval, instead of a circle, as in a perfect eye; lines in one direction are seen clearly, while lines at right angles to these appear blurred. It can be remedied by the use of suitable glasses, whose surfaces are cylindrical, instead of being spherical like those of ordinary spectacles. *Irregular* astigmatism usually results from old injury or disease of the cornea, and can rarely be improved by glasses. See EYE.

Astley, PHILIP (1742–1814), equestrian, was trained as a cabinetmaker, served in the light horse, and after 1770 constructed nineteen amphitheatres for equestrian performances.

Aston Manor, long a municipal and parliamentary borough of Warwickshire, north-east of Birmingham, was in 1911 incorporated with Birmingham, which in 1864 bought Aston Hall and its park for a museum and pleasure-ground. There are some thirty Astons in England, besides Ashtons.

Astor, JOHN JACOB, millionaire, the founder of the 'American Fur Company,' was born in Germany, near Heidelberg, in 1763. A peasant's son, he helped on his father's farm, until in his 16th year he went to London and worked with his brother, a maker of musical instruments. In 1783 he sailed to America, and by the advice of a dealer in furs whom he met on the voyage, invested his small capital in furs. By economy and industry, he so increased his means that after six years he had acquired a fortune of $250,000. Although the increasing influence of the English Fur Companies in North America was unfavourable to his plans, he now ventured to fit out two expeditions to the Oregon Territory—one by land, and one by sea—the purpose of which was to open up a regular commercial intercourse with the natives. After many mishaps, his object was achieved in 1811, and the fur-trading station of Astoria (q.v.) was established; but the war of 1812 stopped its prosperity for a time. From this period Astor's commercial connections extended over the entire globe, and his ships were found in every sea. On his death at New York, 29th March 1848, he left property estimated at $20,000,000, and a legacy of $350,000 for a public library.—His wealth was mainly inherited by his son, WILLIAM (1792–1875), who at his death left $50,000,000. He was known as the 'landlord of New York,' and added $200,000 to his father's library bequest.—A great-grandson, WILLIAM WALDORF, VISCOUNT ASTOR (1848–1919), born in New York and trained for the bar, was minister to Italy (1882), and in 1892 settled in England, where he wrote novels, purchased or founded papers and magazines, and bought estates. —Another great-grandson, JOHN JACOB (1864–1912), built the Astoria Hotel, as his cousin had done the Waldorf (later combined), served as lieutenant-colonel in the Spanish-American war in Cuba, published a romance, invented a bicycle-brake and a pneumatic road-improver, and perished in the *Titanic* disaster.—William Waldorf's son, Waldorf, second Viscount, was Conservative M.P. for Plymouth in 1911–19; as was his American wife after his removal

to the other house. The first woman who actually sat—for the Countess Markievicz held aloof—she soon made herself felt in parliament.

Astorga, EMANUELE D' (1681–1736), born at Palermo, studied music in a Spanish monastery at Astorga in León, composed a *Stabat Mater* and an opera, *Dafne*, and died in Bohemia. His life was overlaid with a tissue of doubtful romance.

Astoria, originally a fur-trading station in Oregon, on the Columbia, founded in 1811 by John Jacob Astor, has large salmon-packing and lumber industries and a trade in grain, &c.; pop. 14,000. The difficulty in navigating the Columbia has been overcome, and there are five miles of water-front within the limits of the city. The British held it in 1813–18, and a British fur company occupied it till 1845. It was chartered as a city in 1876.

Astrabad', a town in the north of Persia, at the foot of the Elburz Mountains, 30 miles SE. of the Caspian. It was long the residence of the Kajar princes, but owing to its remoteness the court was removed to Teheran; and since then it has declined. Pop. 20,000.

Astræ'a, daughter of Zeus and Themis, or of Astræus and Eos (Aurora), was the last of all the goddesses to leave the earth when the golden age had passed away. She took her place in heaven as the constellation Virgo in the zodiac.—Astræa is also the name of one of the minor planets (see PLANETS).

Astrag'alus, or TALUS, a bone of the foot, which, by a convex upper surface and smooth sides, forms, with the leg-bones, the hinge of the ankle-joint. Its lower surface is concave, and rests on the *os calcis*, or heel-bone. See FOOT.

Astragalus. See TRAGACANTH.

Astrakhan', a government in the SE. of European Russia, watered by the Volga, and washed on the SE. by the Caspian Sea. Area, 10,000 sq. m.; population, 500,000. It is almost entirely a barren waste, the only fertile portion being along the Volga. Salt is procured from the marshes of the steppes, considerable numbers of cattle are reared, and fish are taken in the Volga, and sent to Nijni Novgorod. The climate is marked by its extremes, and the population by the variety of its nationalities.

ASTRAKHAN, its capital, and one of the chief towns of Russia, is situated on a high island in the Volga, 41 miles from its mouth in the Caspian Sea. It is surrounded by fruit-trees and vineyards, and consists of the fortress (Kreml), the White Town (Beloigorod), and 16 suburbs (Sloboden). The Kreml and the White Town alone have houses of stone; the suburbs contain wooden buildings only, and irregular, dirty, and unpaved streets. Lengthwise through the middle of the city runs a canal which connects the Kutum arm of the Volga with the main stream. Of nearly 40 Greek churches, the finest is the cathedral (1696), on the highest point in the Kreml. Population, 175,000, consisting of Russians, Armenians, Tatars, and Persians. Almost the entire commerce with Persia and Transcaucasia passes through the city. Its great markets attract every year many thousands of merchants, and its three bazaars are among the busiest marts in Europe or Asia. The city is connected by steamers with all parts of the Caspian, and is the principal harbour of that sea, although it is only when south winds raise the water that it can accommodate the largest vessels. The principal articles imported are wheat, barley, woollen stuffs, spirits, iron, tin, drugs, fruit, gold manufactures, raw silk, cotton, cotton yarn, and cotton fabrics. The industries are shipbuilding, dyeing, silk manufacture, sha-green-working, tallow-melting, seal-oil boiling, and soap-making. The fisheries are of high importance, and rank amongst the greatest in the world. Enormous numbers of sturgeon are taken. A university was set up in 1919.—*Astrakhan* is the name of a fine description of fur, the produce of a variety of sheep found in Bokhara, Persia, and Syria.

Astral Spirits. The star (Gr. *astron*) and fire worship of the eastern religions rested on the doctrine that every heavenly body is animated by a pervading spirit, forming, as it were, its soul; and this doctrine passed into the religio-physical theories of the Greeks and Jews, and even into the Christian world. In the demonology or spirit-systems of Christendom in the middle ages, astral spirits are conceived of sometimes as fallen angels, sometimes as souls of departed men, sometimes as spirits originating in fire, and hovering between heaven, earth, and hell, without belonging to any one of these provinces. Their intercourse with men and their influence were variously represented, according to the notion formed of their nature. As the belief in spirits and witchcraft reached its height in the 15th century, the demonologists, or special students of this subject, systematised the strange fancies of that wild period; and astral spirits were made to occupy the first rank among evil or demoniacal spirits. Paracelsus, however, and others attributed to every human being an astral spirit, or sidereal element, in which the human soul, or spirit proper, is thought to inhere, and which lives for a time after the person dies. Moreover, Paracelsus recognised astral or sidereal elements in matter. Astral salt was the basis of the solidity and incombustible parts of bodies; astral sulphur was the source of combustion and vegetation; astral mercury, of volatility and fluidity. These three elements were analogous to the three elements of man—body, soul, and spirit.

Astringents (Lat. *ad*, 'to,' and *stringo*, 'I bind'), medicines employed for the purpose of contracting the animal fibres and canals, so as to check catarrh, hemorrhage, and diarrhœa. The drugs most commonly used as astringents are alum, catechu, oakgalls, rhatany-root, &c. Many of the vegetable astringents owe that property, in whole or in great part, to tannin. A severe degree of cold is a powerful astringent.

Astroca'ryum, a genus of American palms. See PALM.

As'trolabe (from two Greek words signifying 'to take the stars'), the name given by the Greeks to any circular instrument for observing the stars. Circular rings, arranged as in the Armillary Sphere (q.v.), were used for this purpose. A projection of the sphere upon a plane, with a graduated rim and sights for taking altitudes, was known as an astrolabe in the palmy days of astrology. It has been superseded by the more perfect instruments of modern astronomy. Chaucer published a learned *Treatise on the Astrolabe* in 1391, edited by Professor Skeat in 1872 for the Early English Text Society.

Astrolabe Bay, a large inlet of the sea on the northern coast of the eastern portion of New Guinea, opposite the end of New Britain. The vegetation of the shores is luxuriant; a range of mountains, 14,000 feet high, bounds the view some 15 miles inland; the anchorage is exposed and insecure, and there are no practicable harbours.

Astrology (Gr., 'science of the stars') in early times was a comprehensive term for the study, both of the motions of the heavenly bodies, and of their supposed influence on human and terrestrial affairs. Now it has only the latter meaning, the term Astronomy having usurped the former. Astrology is one of the oldest superstitions, prevailing in very early times among the Egyptians,

Hindus, Chinese, Etruscans, and above all, the Chaldeans. Its rise may be regarded as produced by the impatient curiosity, and desire for harmony, of our race. Long ere any regularly operating laws were discerned in national or individual history, they could be seen in the more marked changes of material nature, among which the motions and influences of the heavenly bodies most conspicuously ranked. In the case of the sun, these ruled and vivified the earth. It was natural, then, to suppose that the overruling power which ordered the apparent chances of human life resided in the heavens, and that its decrees might be read there, the motions of the heavenly bodies proving, on trial, to be predictable. The astrology of the Egyptians was founded on solar theories. They connected each point of the sun's course with a stage of human existence. To them its rising, culmination, and gradual descent figured the progress of man's life in youth, maturity, and age. The Chaldeans, or Chaldaic-Babylonians, included in their system the other planets also. It was chiefly to their labours and fancies that the ancient world owed its astrology. Their name even became a synonym for astrologers, and continued long to be so, and on their system medieval astrology was principally founded. But their astrology was more noble in its conceptions than the degraded medieval and modern forms of the science. They considered the stars and planets not as the mechanical powers ruling men's destinies, but as a revelation of the Supreme Being. They held them as incarnations or emanations—sentient beings—proceeding from the absolute Being. Each planet was thus a visible deity. With this mythology, however, was gradually conjoined accurate observation of the motion of the heavenly bodies (see ASTRONOMY), producing a strange mixture of science and fantastic imagery. In Rome astrology found many adherents, though the educated were generally hostile; Cicero, the elder Pliny, and Tacitus declared against it. Seneca, however, believed in the influence of the stars on men; and astrology profoundly influenced the Alexandrian mystics and the Neoplatonists.

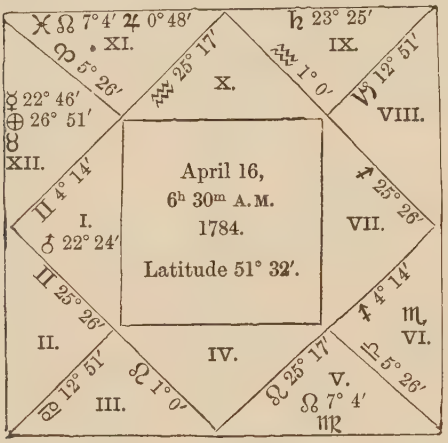
The spread of Christianity in the West, and later of Mohammedanism in the East, entirely altered the character of astrology. By both it was robbed of its polytheistic element. But the Arabs, as fatalists, found its tenets more congenial. Under the Khalifs Al Mansur and Albumazar it was diligently cultivated, and is still accepted by the Arabs everywhere. How inwrought in Mohammedan society it became may be seen by any student of the *Arabian Nights*. To Christianity it was less akin; though its influence appears in the beautiful story of the wise men of the East journeying to our Saviour's cradle. These were most probably Chaldean magi and astrologers. Some of the early fathers, however, accepted or modified the doctrine of astrology. Clemens Alexandrinus, Origen, and Augustine, all protest against it. By later church authority it was regarded as obnoxious, and several times publicly condemned. But by many zealous Catholics, and even churchmen, it was cultivated. Cardinal D'Ailly, in the 15th century, is said to have calculated the horoscope of Jesus Christ, and maintained the astrological predictability of the deluge. Louis XI. of France, among his many superstitions, numbered also this, and maintained for long the astrologer Galeotti. Nostradamus (q.v.) was the great astrologer of the 16th century; during which, though the most learned and powerful minds continued to cultivate the science, it gradually declined from its former position of credit and power. It could not endure the double assault of the Reformation and its accompanying spirit of true scientific inquiry. Tycho Brahé, Kepler, and Gassendi represent well this stage in its history. Their own discoveries, with those of Copernicus and Galileo, sapped its foundations, though they could not shake off its influence on themselves. Protestant theologians like Melanchthon cultivated the science. Paracelsus and Cardan combined astrology with alchemy and medicine. Burton, of the *Anatomy*, died about the date he had himself forecast. Robert Fludd and William Lilly in England represent the latest period of the public power of astrology. The latter especially is well known by his almanac, his prophecy of the great plague and fire of London, and his claim to foresee the fate of Charles I. He was even for a time pensioned by parliament for giving information. Dryden had his children's nativity reckoned. With Newton, astronomy emerged from mystery. His conceptions extended the terrestrial laws of the planets. The sun and stars—in his words, 'but great earths vehemently hot'—could no longer be viewed as rulers of destiny, and astrology thenceforth passed into the hands of quacks and pseudo-scientists, only an isolated effort being made here and there to rehabilitate it.

For great solitary minds, astrology has ever had an attraction. Wallenstein was a complete believer in it, and Napoleon I. often spoke of his star and his destiny, and through them was accessible to flattery. A modern astrologer declares that Napoleon and Wellington were born, the one under Saturn, the other under Jupiter, in the house of dignities. Hence Napoleon's dignities were misfortune to himself and others, Wellington's were beneficent, and finally superior. This astrologer was not a Frenchman. One of the last professed astrological authors of standing was Pfaff in Germany, who published his *Astrologie* in 1816. Amongst Parsees the wedding-day is fixed by an astrologer.

Natural astrology, the science by which the motions of the heavenly bodies were predicted so far as the knowledge of the time might allow, contained much of scientific value, and is now absorbed in Astronomy (q.v.).

The science of *judicial* astrology, which studies to predict terrestrial occurrences by means of the heavenly bodies, is simple. For its purposes the celestial sphere was divided into twelve sectors called 'houses of heaven.' The surface of a peeled orange appears divided in a manner which fairly represents these. Place the axis of the fruit horizontally in a north and south line, then the divisions of its surface will represent their position on the most common system. If its axis be inclined so as to point either to the pole of the equator or ecliptic, it will show the houses on other less common plans. These houses are supposed fixed, and the planets in their diurnal and orbital movements thus pass from one to another, traversing them all in a day. We shall use only the common system in explaining. On this, as the astrologer stood looking southward, he would have six houses dividing the visible heavens, in order from left to right, the horizon dividing these from the six below him. In three ways these houses differed. Their power depended on their *position*, the one containing the stars about to rise being most powerful. It was called the 'ascendant' (hence our expressions 'ascendency' and 'his star is in the ascendant'). Secondly, the houses differed in their subject matter, thus: (1) Life, (2) riches, (3) brethren, (4) parents, (5) children, (6) health, (7) marriage, (8) death, (9) religion, (10) dignities, (11) friends, (12) enemies. Thirdly, certain houses belonged to certain planets, which, when in them, had peculiar power. How the characteristics of a

house were summed up may be seen from the following description, taken, however, from a work founded on the *ecliptic* scheme. 'Cancer (in this scheme the fourth house) is the sign of the tropic, particularly fruitful, but cold, watery, nocturnal, northerly, movable, weak, and mute. It is the house of the moon, and exaltation of Jupiter. It produces fair and pale complexions, round features, gray or mild blue eyes, weak voice, the superior portions of the body large, slender arms, and an effeminate constitution.' Three houses were assigned by the observer to each of the four ages of the person whose horoscope was drawn, and we can easily see how, having fixed the planetary configurations, he had the means of a pseudo-scientific prophecy at his disposal.



Usual Method, in drawing a Horoscope, of representing the Twelve Houses of Heaven.

From the above description it can also be seen how closely astrology was connected with physiognomy and observation of bodily appearance. Each planet—in some schemes each house—ruled certain parts of the world and of the human body, being thus productive or avertive of certain diseases, and specially ruling certain states. Mars was lord of iron and the blood. Aries ruled Great Britain, France, and Germany. A conjunction of Mars and Saturn (malignant in his influence) in Aries might then threaten war and pestilence to a great part of Europe. Gemini ruled the arms and shoulders. But different authorities, in a matter so much of fancy, differed much in assigning those properties, and fierce controversies have raged between them, now happily forgotten. Still, however, many accept this strange, but not unnatural, superstition. The astronomer royal is often annoyed by letters requesting him to draw the horoscope of children, or to help by the stars in finding lost property. Hence astrology is now a means of extracting money from the simple. The 'astrology man,' or sometimes 'woman,' still has a delineation of the zodiac in his darkened room, and conjures with it to the loss of curious servant girls and apprentices. *Zadkiel's Almanac* and the magazine *Urania*, by their existence show, too, that such credulity is not confined to the illiterate. But the chief interest of astrology to the educated is as an almost forgotten, but remarkable, development of the mind of man. Our everyday language, however, still testifies to the once widespread belief in astrology. We still speak of men as 'jovial,' or 'saturnine,' or 'mercurial' in temperament—an unconscious survival of a time when the planet under which a man was born permanently influenced his life. Jupiter or Jove was the joyfullest star, hence those born when he was in the ascendant were *jovial* and joyous; while those born under Saturn were *saturnine*, grave, and gloomy; and those under Mercury as *mercurial* and light-hearted as himself. The words 'disastrous,' 'ill-starred,' 'ascendency,' and 'influence,' as well as such phrases as 'born under a lucky star,' point in the same direction. Long after astrology ceased to be a belief, it retained its power over the imagination. Thus allusions to it are frequent in Milton, Ben Jonson, and their contemporaries, though its claim to being a real science was by that time generally discredited. It is interesting to see that even Chaucer in his later tales had come to think it a delusion, though in earlier years he must have been a devoted student of it, as is testified by his learned discussion of the subject in his *Treatise on the Astrolabe*, written for his son and published in 1391.

See Henry Christmas's *Cradle of the Twin-Giants* (1849); Sayce's *Astronomy and Astrology of the Babylonians* (1873); R. C. Thompson's *Reports of the Magicians and Astrologers of Nineveh and Babylon* (1901 *et seq.*); the bibliography in *Notes and Queries* for 1891; A. T. Story's *Holmes and Varley* (1894); and treatises on astrology by 'Raphael' (R. C. Smith; 1828, new ed. 1884), 'Zadkiel' (R. J. Morrison; 1832, new ed. 1862–63), A. J. Pearce (1889), and Wilde and Dodson (1894).

Astronomy is the most ancient of the sciences. The Chinese, Hindus, Chaldeans, and Egyptians observed and studied the heavens long before the Christian era. It is uncertain to which of these nations priority should be given, but Western astronomy traces its ancestry through the Greeks to the Egyptians and Chaldeans. The Chinese have astronomical annals, claiming to go back to 2857 B.C., which record comets and solar eclipses. In the reign of the Emperor Yao, 2300 B.C., there were professional astronomers, who were compelled, on pain of death, to predict solar eclipses, so that the necessary steps might be taken to propitiate the dragon which was supposed to devour the sun. At an early period the Chinese fixed the length of the year at 365¼ days, and were acquainted with the remarkable cycle—afterwards discovered by Meton about 400 B.C.—that nineteen years are equal to 235 months. In the 11th century B.C. they are said to have made observations of the height of the sun at the solstices in midwinter and midsummer, and thus fixed the inclination of the ecliptic.

The Chaldean priests observed the times of rising and setting of the heavenly bodies from a very early period, and recorded the dates and circumstances of eclipses. Callisthenes, who accompanied Alexander the Great to Babylon, is stated by Simplicius and Porphyry to have discovered on tablets of baked clay records of eclipses dating back to 2234 B.C. A Babylonian tablet in the British Museum records an eclipse of the sun which occurred in 1062 B.C. From their catalogues they discovered the cycle called the Saros, of about eighteen years and ten days, after which eclipses very approximately recur. The Chaldeans knew that the year consisted of 365¼ days, discovered the sun-dial, and divided the day into twenty-four hours. They observed the movements of the planets among the stars, and between 2000 and 3000 B.C. had noted the annual motion of the sun among the constellations of the zodiac. The discovery that the sun moves among the stars, completing its circuit in a year, is a great landmark in the history of astronomy.

The Egyptians fixed the length of the year at 365¼ days. This was of special importance to them in connection with the rising of the Nile, and they are probably the first nation to substitute the year for the month as the standard measure of time. The accurate orientation and other features in the

construction of the Great Pyramid show that they possessed considerable astronomical knowledge. But they appear to have studied geometry and geodesy more than astronomy, and not to have made such great progress as the Chaldeans.

Thales (640 B.C.), the founder of the Ionian school of philosophy, is credited by later writers with having introduced Egyptian astronomy into Greece. He is said to have predicted the eclipse in Ionia which occurred in 584 B.C. whilst a battle was being fought between the Medes and Lydians, and was acquainted with the Babylonian Saros. He taught that the stars were made of fire, and had vague ideas as to the spherical form of the earth.

Pythagoras (6th century B.C.) and his followers made considerable progress. He taught that the earth, like the heavenly bodies, was spherical, and rested in the middle of the universe without requiring any support. The stars, he supposed, were attached to a crystal sphere which revolved daily on an axis through the earth, while each of the seven planets (i.e. the sun, moon, Mercury, Venus, Mars, Jupiter, and Saturn) moved on a sphere of its own. These, as they revolved, made the music of the spheres. Pythagoras is said to have discovered the identity of the morning and evening star (the planet Venus). He appears to have explained correctly the phases of the moon as arising from its being a spherical body illuminated by the sun, seen at different angles.

A number of astronomical references are found in Plato's *Dialogues*. Plato did not encourage observations of the movements of the heavenly bodies, but is said to have suggested to his pupils the task of explaining the celestial motions as made up of uniform circular movements. Eudoxus (409–356 B.C.) attempted this, and may be regarded as a predecessor of Hipparchus in trying to formulate a geometrical representation of the movements of the planets. From Aristotle (384–322 B.C.) we obtain a complete view of Greek astronomy of the time. He gives several proofs that the earth is spherical: the circular edge of its shadow cast by the sun on the moon in lunar eclipses; some stars are seen to rise above the horizon and others to disappear when one travels north or south. He argues against the earth's rotation on the ground that no changes are perceived in the positions of the stars. He concluded that the moon was nearest to the earth of all the celestial bodies, then the sun, then the planets, and finally the fixed stars. Alexandria next became the centre of astronomical learning and discovery. Aristarchus gave a method of finding the relative distances of the sun and moon, and concluded that the sun was twenty times more distant. Timocharis and Aristyllus made observations of the relative positions of the fixed stars, thus making the first catalogue of the stars. Eratosthenes (276–196 B.C.) determined the size of the earth by measuring the distance from Alexandria to Syene in southern Egypt, combined with the observation that at the summer solstice the sun was in the zenith at Syene, but $\frac{1}{50}$th part of the circumference of a circle (about 7°) to the south of the zenith at Alexandria. He determined the obliquity of the ecliptic to be 23° 51′, the error of which is only 7′.

The greatest of Greek astronomers, Hipparchus of Bithynia (190 to 120 B.C.), was a mathematician and invented trigonometry, and was thus able to make numerical calculations of the movements of the heavenly bodies. He was also a great observer, and made a catalogue of the positions of no less than 1081 stars, being stimulated to this by the appearance of a new star in the constellation of the Scorpion. Comparison of this catalogue with the earlier ones of Timocharis and Aristyllus led him to the discovery of the precession of the equinoxes. He determined the distance of the moon with great precision as fifty-nine times the radius of the earth. He determined the inclination of the moon's orbit to that of the ecliptic. He also determined the eccentricity of the moon's orbit, and discovered the revolution of the apse—or nearest point of the orbit to the earth—in a period of nine years. The sun moves more rapidly among the stars in the winter than in the summer. Hipparchus showed that its movement could be represented by supposing the earth to be a little way from the centre of the circle which the sun describes uniformly. He placed the earth at $\frac{1}{25}$th of its distance from the sun away from the centre, making the sun farthest from the earth near the beginning of June. By the use of the eccentric and the epicycle he was able to give a representation of the celestial movements, which was as accurate as the observations of the time allowed. In other words, he obtained a mathematical formula which agreed with the movements of sun, moon, and planets, and could be used for predicting their positions with all the necessary accuracy. In his system the earth was placed at the centre. It is said that he was nearly persuaded to adopt the heliocentric views of his contemporary Seleucus. Had he done so, the heliocentric system would have doubtless been the received doctrine of astronomy 1500 years before Copernicus. Astronomy was left by Hipparchus as an exact science. No substantial additions were made for two and a half centuries. Ptolemy (130–150 A.D.) found an inequality in the motion of the moon known as the evection. He also discovered that the earth's atmosphere refracts the light from the stars, and pointed out the effects of this refraction. His great astronomical treatise, the *Great Collection* (generally known by its Arabic title the *Almagest*), is a complete exposition of the views and theories of Hipparchus, with improvements and extensions in detail made by Ptolemy himself. From this book our knowledge of Greek astronomy is mainly derived; by it the great science of astronomy which had been built up by the Greek geometricians was preserved to the world; further, it occupied the unique position of being the received scientific authority for no less than 1400 years.

The history of astronomy may be rapidly summarised from the publication of the *Almagest* to the death of Copernicus (1543). In the year 762 A.D. the Khalif Al Mansur established an observatory at Bagdad, and his successor, Haroun Al Raschîd, the hero of the *Arabian Nights*, had the *Almagest* translated into Arabic. Astronomical instruments were improved, and observations made regularly. Albategnius, who made accurate observations from 878 to 918 A.D., determined the inclination of the ecliptic and the rate of precession of the equinoxes with greater accuracy, and found that the position of the sun's apogee (i.e. its greatest distance from the earth) had changed since the time of Ptolemy. He introduced the use of sines and versines instead of chords. In the 11th century the Persian poet Omar Khayyam had charge of an observatory, and carried out the reform of the calendar referred to in the Rubaiyāt.

In the 13th century Nasir-Edin, under the patronage of the grandson of Genghis Khan, established a magnificent observatory at Meraga in northern Persia. His instruments were larger and more accurately made than any previously in use. He determined the precession of the equinoxes as 51″ annually (only 1″ in error), and constructed tables for computing the movements of the planets.

Ulugh Beg (1394–1449), a grandson of Timur, made an observatory at Samarkand, and reobserved with great accuracy the positions of the fixed stars given in Ptolemy's catalogue. The Arabs and their successors made no important original discoveries in astronomy. They corrected and improved in detail the theories of the Greeks. But

they advanced astronomy by their improvement of instruments and the habit of making regular and systematic observations. The introduction of the Arabic system of numeration greatly facilitated astronomical computations by the simplification of arithmetical work.

In the 13th century astronomy was introduced into western Europe, the first translation from the *Almagest* being made under the Emperor Frederick II. about 1230; and in 1252 an impulse was given to the science by the formation of astronomical tables under the auspices of Alphonso X. of Castile. A Yorkshireman, John Holywood (Sacrobosco), about this time wrote the *Sphæra Mundi*, largely a translation from Ptolemy, a book which had a great influence for several centuries. Purbach at Vienna, 1460, and his more famous pupil, Regiomontanus of Königsberg (1433–76), who afterwards published at Nuremberg *Ephemerides* and data for finding latitude and longitude at sea, and his pupil Waltherus, by their observations and published books fostered the growing zeal for the study of astronomy.

A new epoch in astronomy opens with Copernicus (1473–1543). He pointed out that the common diurnal movement of the stars is explained by the rotation of the earth; that the annual movement of the sun is as well accounted for by a revolution of the earth round the sun as of the sun round the earth; and that the assumption that the earth and planets are revolving round the sun in concentric circles with suitable velocities explains why the inner planets Mercury and Venus oscillate from one side of the sun to the other; and why periods of retrograde movement among the stars occur periodically in the motion of the planets Mars, Jupiter, and Saturn. This simplification in the celestial movements was only brought about by an hypothesis which demanded much from the imagination—namely, that the earth, which to our senses appears fixed, is turning and moving with a great velocity. Copernicus, through fear of the opposition such views would encounter, hesitated for a time to publish them, and his book *De Revolutionibus* was only printed in the year of his death. As this treatise required considerable knowledge of mathematics, it appealed only to the learned, and no great commotion was made by the heretical nature of its contents. Reinhold, professor of mathematics and astronomy at Wittenberg, calculated the *Precession Tables* on the basis of the *De Revolutionibus*. Rheticus, also a professor of mathematics and astronomy at Wittenberg, was another enthusiastic advocate of the Copernican system. Through their advocacy it came into use, at any rate as a geometrical hypothesis, by means of which planetary movements were calculable.

A great advance in astronomy in a wholly different direction was made by Tycho Brahe (1546–1601). He was a great astronomical observer. For years he observed the sun and planets whenever possible, and not occasionally, as most of the older astronomers had done. Astronomical instruments were constructed by him of great size and accuracy. To determine the altitudes of celestial bodies he made a quadrant of radius 19 feet, whose rim was divided to each minute (1′). The accuracy he attained in his numerous observations was such that Kepler speaks of an error of eight minutes as incredible. He did not accept the Copernican system, but made all the planets except the earth revolve round the sun. He made important discoveries in connection with the motion of the moon—the variation, annual equation, and inequalities in the movement of the nodes. He calculated the first table of refractions. In 1577 he made observations of the comet which appeared in that year, and proved that it was at least three times the distance of the moon, thus refuting the current doctrine that comets were exhalations in the atmosphere. He made careful observations of the new star which appeared in 1572, and showed that the distance of this body was so great that it must be in the region of the fixed stars.

Kepler (1571–1630), the pupil of Tycho, was entrusted with the study of the planet Mars, of which a very valuable series of observations had been made. He pursued his task with almost incredible perseverance, trying hypothesis after hypothesis. Ultimately he discovered that the observations were satisfactorily represented by the assumption that the earth and Mars described ellipses about the sun as focus. He enunciated the famous laws of planetary motion associated with his name (see KEPLER)—laws which, apart from the very minute action of one planet on another, accurately describe the orbits and velocities of the planets around the sun.

The final establishment of the Copernican system was accomplished by Galileo (1564–1642). Having heard of an instrument invented in Holland which made distant objects appear near, but without any knowledge of the method of its construction, he made a telescope for himself, and with it scrutinised the heavens. He was rewarded by a succession of remarkable discoveries. Many more stars were seen than were visible to the naked eye. The moon's surface showed inequalities, which appeared like mountains and seas. The planet Venus showed phases like the moon. The planet Jupiter was seen to be accompanied by four bright companions which circulated round it. The sun was seen to have spots whose movements indicated its rotation on an axis. The bearing of these observations on the Copernican hypothesis was pointed out by Galileo. If the sun rotates, why not the earth? If Jupiter travels round the sun accompanied by its satellites, why cannot the moon accompany the earth? The sensible discs of the planets suggested that they were bodies like the earth. The geometrical arguments of Copernicus were thus reinforced by more popular ones based on these new observations, and the view was established that the earth and the planets were similar bodies revolving round the sun as centre. Galileo published his opinions in an attractive form in a *Dialogue on the Two Chief Systems of the World, the Ptolemaic and Copernican*. This book met with approval in the universities of Europe, but brought on Galileo the condemnation of the Inquisition (see GALILEO).

The next great epoch in the history of astronomy is the publication of Newton's *Principia* in 1687. In the half-century which intervened between this and the discoveries of Kepler and Galileo important progress was made in many directions. Scheiner, a rival of Galileo's, who disputed with him priority in the discovery of sun-spots, found faculæ, or brighter areas, on the solar surface. Hevelius (1611–87) in his *Selenographia* carefully mapped and described the surface of the moon; in his *Cometographia* he collected all the observations that could be found of comets; and published an accurate catalogue and atlas of 1500 fixed stars. Huyghens (1629–95) discovered that the appearances round Saturn which had puzzled Galileo were caused by a thin, flat ring surrounding the planet in the plane of its equator, and seen at different times from different points of view owing to the earth's motion. He also discovered the satellite Titan. Huyghens greatly improved telescopes; but his important service to astronomy is his adaptation of the pendulum to clocks, by which a timekeeper sufficiently reliable for astronomical purposes was first obtained. This added to the astronomer's equipment an instrument of as great value as the divided quadrant for measuring the positions of

the stars. Gascoigne, who was killed at Marston Moor in 1644, by placing wires in the focal plane of the object-glass furnished the telescope with a definite line of sight, and thus made it an instrument of precision in determining the directions of the stars. Snell in Holland and Picard in Paris made accurate geodetic measurements, which gave very correct values of the size of the earth. Picard was associated with Cassini (1625–1712), who was appointed by Louis XIV. director of the Paris Observatory, completed in 1671. Cassini discovered the rotation of Jupiter and Mars about their axes, four satellites of Saturn, and the division in its ring called after him. Under the direction of these astronomers an expedition was sent to Cayenne, near the Equator, in 1671–73. From a simultaneous series of observations of Mars made at Cayenne and at Paris the difference in position of Mars among the stars, as seen from the two stations, was determined. In this way the parallax of Mars, an angle which measures the ratio of the earth's radius to the distance of the planet, and thus the distance itself, was determined. As the relative distances of the planets from the sun are given by Kepler's laws, a great problem in astronomy—the determination of the sun's distance and the scale of the solar system—was solved. The distance of the sun was found to be 87 millions of miles, in good agreement with the modern value of 92,880,000 miles. Another important discovery made in this expedition was the fact that a pendulum of given length beat more slowly at Cayenne than at Paris. This observation was subsequently interpreted by Newton as showing the spheroidal form of the earth. Among other discoveries which contributed to the advance of astronomy may be mentioned the algebraic method of studying geometry devised by Descartes, and the invention of logarithms by Napier.

Newton (1643–1727), in the *Laws of Motion*, stated the relationship between forces and the changes of motion produced by them. Applying the principles he had enunciated to the laws of planetary motion discovered by Kepler, he found that each planet was attracted to the sun by a force which varied inversely as the square of the distance. He was led to the law of universal gravitation, that 'every particle of matter attracts every other with a force proportional to the product of the masses and inversely as the square of the distance between them.' He then, with the greatest mathematical genius, deduced from this single principle an explanation of the movement of the planets about the sun, of comets, the most important features in the movement of the moon disturbed in its elliptic motion around the earth by the sun, the spheroidal figure of the earth, the action of the sun and moon in causing the tides, and the movement of the earth's axis which gives rise to the precession of the equinoxes. See NEWTON.

Newton bequeathed to the mathematicians and astronomers who succeeded him the task of verifying that the minutest details in the movements of the heavenly bodies were deducible from the law of gravitation. He had used geometrical methods, but a great development of analysis and of theoretical dynamics was required before the intricacies of planetary and lunar motions could be traced to their gravitational source. This was in the main accomplished by about the end of the 18th century by a great school of mathematicians, mainly French, of whom Euler, Clairaut, D'Alembert, Lagrange, and Laplace are the greatest names. D'Alembert, Euler, and Lagrange developed theoretical dynamics; Clairaut the theory of the earth's figure and the variation of the force of gravity on its surface; Euler and Clairaut the theory of the moon's movements; Lagrange and Laplace the interaction of the planets. Laplace, in particular, made important contributions to all branches of gravitational astronomy; and in his great work, the *Mécanique Céleste*, published in 1802, all the more important movements of the bodies in the solar system are deduced as consequences of Newton's law. See LAPLACE.

The ever-increasing accuracy and extent of observational astronomy has made increasing demands on gravitational theory. There are still a few outstanding discrepancies; though they are extremely small, it is not impossible that they are evidence of forces in the solar system other than that of gravitation. The movement of the node of Venus and of the apse of Mercury are not in exact accord with theory (but see RELATIVITY). Of all the problems of gravitational astronomy, a complete theory of the movements of the moon has been the most difficult. Hausen, Delaunay, G. W. Hill, and E. W. Brown, developing more completely the theory of Hill, completely investigated not only the influence of the sun, but also of the planets and of the spheroidal figure of the earth in the movement of our satellite. There still remain two or three small but well-marked discordances between theory and observation.

The completeness with which the theory of gravitation accords with the observed motions of the planets may be well seen by the circumstances attending the discovery of the planet Neptune. The motions of Uranus, the planet discovered by Herschel in 1781, were closely watched and the orbit it should follow calculated. For fourteen years its positions agreed sufficiently well with those predicted for it, and then for twenty-seven years were more and more in advance of the predicted places, after which it fell back again. The greatest amount of this divergence was 2′, or only one-fifteenth of the apparent diameter of the moon, a quantity barely perceptible to the naked eye. Suggestions were made that the attraction of an undiscovered planet exterior to Uranus was the cause of this irregularity. Two astronomers, Leverrier at Paris and Adams at Cambridge, attempted to find by mathematical calculation the position of the disturbing planet. Search was made for the planet at Cambridge and Berlin, and it was found by Dr Galle at Berlin on September 23, 1846, within 1° of the position assigned by Leverrier and 3° of that assigned by Adams.

A great impulse was given to observational astronomy, as well as to gravitational theory, by the attempt to supply sailors with satisfactory data for determining their positions at sea. It was represented to Charles II. that the existing catalogues of stars were unreliable, and on his initiative the Royal Observatory was founded at Greenwich in 1676. John Flamsteed, who had drawn attention to the need for observations of the positions of the stars, was appointed Astronomer Royal. He was an assiduous and accurate observer; and the *Historia Cœlestis*, published by him in 1725, contains the positions of 2884 stars. He determined the right ascensions of stars from the times of their meridian transits, making use of a clock—the method in use at the present day. He was succeeded by Halley, the friend of Newton, who discovered, from comparison with Ptolemy's catalogue, that some of the brighter stars possessed *proper motions*, and by examination of early records of eclipses that the mean motion of the moon per century was slowly increasing. He is still more famed for his recognition that the comet which appeared in 1682 had visited the earth on two previous occasions, and his confident prediction that it would return about the year 1759. His successor was James Bradley, who discovered the aberration of light and the nutation of the earth's axis. He also made a catalogue of 3200 stars, based on 60,000 observations. This catalogue of stars, which was re-reduced by Bessel

and again by Auwers, is the starting-point of modern stellar astronomy. These observations are the earliest which are of sufficient accuracy to be compared with modern observations for the determination of the proper motions of the stars. Contemporary with Bradley was the French astronomer Lacaille. In an expedition to the Cape (1750–54) he made observations of 10,000 southern stars. By comparison of observations at the Cape and in Europe he redetermined the parallaxes of the sun and moon. He also made pendulum observations at Mauritius and the Cape, and measured at the Cape an arc of the meridian of more than 1° of length. He also made excellent solar tables based on a large number of observations, and included in the calculations the perturbing effects of the planets on the earth's ellipse round the sun.

Germany was represented during this period by Tobias Mayer of Göttingen. He had a good instrument, which he carefully studied; and his observations of stars made about 1755 are only second to Bradley's, and have been found worthy of re-reduction in recent times. Combining the mathematical method of Euler with a careful determination from observation of the numerical values of certain constants, he worked out a lunar theory from which he calculated tables for predicting the moon's position. Mayer died soon after these tables were published in 1753. On Bradley's favourable report of the accuracy of the tables the sum of £3000 was awarded to Mayer's widow by the British government, as part of a prize of £20,000 offered for lunar tables of sufficient accuracy to be used in determining longitude at sea.

The application of astronomy to the purposes of navigation was furthered by Maskelyne, who was Astronomer Royal from 1766 to 1811. He instituted the *Nautical Almanac*, in which the positions of the sun, moon, and planets are calculated for several years ahead. The necessity for this arises from the fact that the calculations of positions of the heavenly bodies, and especially the moon, are too complex and long to be made by a navigator. Maskelyne is also famous for his determination of the mean density of the earth from the observation of the attraction of the mountain Schiehallion on the plumb-line.

During the 18th century notable improvements were made in astronomical instruments. Bradley's quadrants by Bird were so well constructed and divided that the altitudes of stars were observable within a few seconds of arc; Dollond's discovery of the achromatic object-glass vastly improved the telescope; Graham and Harrison made clocks instruments of great precision; and Harrison invented the chronometer.

We come now to Sir William Herschel, who was the pioneer in the study of the fixed stars and the construction of the sidereal universe. With the large reflecting telescopes, constructed by himself, he discovered the planet Uranus, satellites of Saturn and of Uranus, the existence of double stars circulating about one another, and of nebulæ. His indefatigable observations were accompanied by daring speculations, and we owe to him the discovery of the movement of the sun through space and the first determination of the form of the sidereal universe. As Galileo revealed the system of the planets, so Herschel revealed the system of the stars. His observations extended from 1772 till 1820, two years before his death at the age of eighty-two. They were continued and extended to the southern heavens by his son, Sir John Herschel.

A great step in our knowledge of the stars was taken in 1838, when, almost simultaneously, Bessel determined the distance of 61 Cygni, Henderson that of α Centauri, and Struve that of α Lyræ. These stars were found to be at distances of 600,000 times, 720,000 times, and 800,000 times the distance of the sun from the earth. The determination of stellar distances had long engaged the attention of astronomers, especially after the acceptance of the Copernican system. This important and arduous work has been carried on at Leipzig by Peter, at the Cape by Gill, and at Yale by Elkin and Chase. These observers have employed the heliometer, the form of instrument used by Bessel and first constructed by Fraunhofer. Photography has simplified the determination of parallaxes, and great progress in this direction is being made at the present time.

The early part of the 19th century witnessed the development of the transit-circle, by which, in combination with a clock, accurate positions of the heavenly bodies are determined when they cross the meridian. Instrumental improvements and simplifications in the details and methods of reduction were made by Struve, Argelander, Bessel, and Airy. Catalogues giving the positions of many stars with great accuracy were constructed by these astronomers. Other catalogues, of greater numbers but inferior accuracy, were made by Piazzi, Lalande, and Groombridge at the beginning of the century. Later in the century a great extension in this class of work took place in national observatories. Under the auspices of the Astronomische Gesellschaft a number of observatories in Europe and America have combined to form a catalogue of all stars down to the ninth magnitude from the North Pole to 30° S. declination. This work owes its importance to the information derived from it of the proper motions of stars on the face of the sky, and the statistical inferences deducible as to the distances and movements of the stars. The systematisation of the numerous catalogues of stars and the elimination of errors inherent in them has been undertaken by Auwers, Boss, and Newcomb, and has contributed largely to their accuracy and value. During the 19th century telescopes were improved both in size and the perfectness of their definition. The largest object-glass made by Dollond had a diameter of only $3\frac{3}{4}$ inches. Early in the century a Swiss artist, Guinand, discovered how to cast larger discs of glass of the necessary uniformity. He was employed by Fraunhofer, who constructed object-glasses of great perfection of 6 to 9 inches aperture. In 1840 a 15-inch object-glass was made by Merz for the Imperial Observatory at Pulkowa; in 1870 a refractor of 25 inches (the Newall telescope now at Cambridge) was made by Messrs Cooke. The largest refractors of the present day are the 36-inch of the Lick and the 40-inch of the Yerkes Observatories, both made by Alvan Clark & Sons. The reflecting telescope, invented by Newton, and developed so greatly by Herschel, entered on another stage owing to Liebig's discovery of a process of depositing a metallic film of silver on glass. Large reflectors were made by Common in England from 1883 to 1898. Still larger and more perfect ones have since been made by Ritchey in America, of which the largest yet completed is a 60-inch mirror of the Mount Wilson Observatory in California.

The experimental determination by Kirchoff in 1859 of the meanings of the dark lines in the solar spectrum opened up new fields of research into the physical and chemical constitution of the heavenly bodies. In solar research, Lockyer, Janssen, Young, Hale, and Deslandres are the most prominent names. The application of spectroscopy to the stars was commenced by Huggins and Secchi. The former discovered the existence of terrestrial elements in the stars, the gaseous nature of some of the nebulæ, and the chemical and physical constitution of comets. The latter made a classifi-

cation of thousands of stars according to the character of their spectra. Huggins initiated the determination of velocities of stars to or from the earth from the small shift in the positions of their spectral lines. This was brought to success by Vogel after the introduction of photography. It has received great development from the increased size of telescopes, and in recent times the velocities of hundreds of the brightest stars have been determined with great accuracy by European, and especially by American, astronomers.

The introduction of photography, and especially of the dry plate, has been of great service in many directions; most of all in spectroscopic researches. At several observatories daily photographs of the sun are taken for the study of sun-spots. At others, with the spectroheliograph, the sun is photographed in monochromatic light for the study of prominences and of flocculi. In eclipses all important observations are photographic. Photographs taken with large reflecting telescopes have revealed the forms and extent of the nebulæ, and the forms and changes in the tails of comets. Many minor planets have been discovered, and several small satellites of Jupiter and of Saturn, by means of photography, which has done good service where exact measurements over a limited field are required, as in measures of stellar parallax, of the solar parallax through that of a minor planet, of the positions of satellites, minor planets, and comets. An International Photographic Chart of the Heavens was inaugurated at Paris in 1884. This chart gives the positions of millions of stars, since the positions of the brighter stars seen on the photographs are known, and serve as a framework of reference for the rest.

The continuation of visual observations is necessary for the determination of the accurate relative positions of the brighter stars. They are also generally employed in some other researches, such as the determination of the variation of latitude. The quivering and want of steadiness created by the earth's atmosphere makes visual observations essential in the measurement of close double stars, and cause these to be generally preferred in the examination of planetary details.

According to the plan of this work, the detailed treatment of the extensive subject of astronomy is given in the separate articles on the most important departments of investigation and instruments. The principal articles will be found under the following heads:

Aberration of Light.	Kepler.	Planets.
Acceleration.	Laplace.	Poles.
Altazimuth.	Lat. and Long.	Precession.
Aphelion.	Libration.	Ptolemy.
Apsides.	Meridian.	Quadrant.
Ascension, Right.	Meteors.	Reflection.
Comet.	Moon.	Refraction.
Constellation.	Mural Circle.	Satellites.
Copernicus.	Nebulæ.	Scintillation.
Cycle.	Newton.	Seasons.
Day.	Nodes.	Sextant.
Earth.	Nutation.	Solar System.
Eclipses.	Observatory.	Solstice.
Ecliptic.	Occultation.	Spectrum.
Elements.	Optics.	Stars.
Equatorial.	Orbit.	Sun.
Equinoxes.	Orrery.	Telescope.
Galaxy.	Parallax.	Tides.
Gravitation.	Period.	Transit Instrument.
Halley.	Perturbation.	Twilight.
Herschel.	Phases.	Year.
Horizon.	Photography.	Zodiac.
	Photometry.	Zodiacal Light.

Readers may consult for further information Berry's *History of Astronomy* (1898); Grant's *History of Physical Astronomy* (1852); A. M. Clerke's *History of Astronomy during the 19th Century* (ed. 1908); Ball's *Story of the Heavens* (1885); Young's *General Astronomy* (1888); Moulton's *Introduction to Astronomy* (1907); Turner's *Astronomical Discovery* (1904); Bryant's *History of Astronomy* (1907); Dyson's *Astronomy* (1910).

Astruc, JEAN (1684–1766), born in Languedoc, became a distinguished professor of medicine at Montpellier (1717) and at Paris (1731), and wrote on midwifery and kindred subjects; but his most famous work (1753) was that in which, distinguishing between Elohistic and Jehovistic sources, he founded the modern criticism of the Pentateuch (q.v.).

Astu'rias was a northern principality of Spain, equivalent to the modern province of Oviedo (q.v.).

Asty'ages, the last king of Media, dethroned by Cyrus about 550 B.C. See MEDIA, CYRUS.

Asunción, capital of Paraguay (q.v.), stands on a terrace on the left bank of the Paraguay River, and is connected by rail (1911) with Buenos Aires, the Paraná being crossed by a train-ferry. It was founded in 1536, on 15th August, the feast of the Assumption. Pop. 100,000.

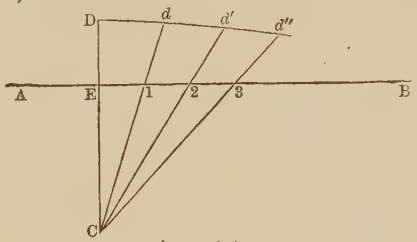
Asur, an ancient empire, its early capital, and its chief god; for all of which see ASSYRIA.

Asur-bani-pal, Asur-nazir-pal. See ASSYRIA.

Aswan. See ASSUAN.

Asy'lum. See SANCTUARY, INSANITY.

Asymptote (Gr., 'not coinciding'), a line that continually approaches nearer and nearer to some curve, but only meets it at an infinite distance. An example of an asymptote will be seen under HYPERBOLA. As another illustration, let AB be a straight line which can be produced to any length towards B. Take any point, C, without the line, and draw a perpendicular reaching to any distance, D, beyond the line; set off any equal distances, E—1, 1—2, 2—3, &c., along AB; and draw C1*d*, C2*d'*, C3*d''*, &c., making 1*d*, 2*d'*, 3*d''*, &c., equal to ED. Now it is evident that each of the points *d*, *d'*, &c., is nearer to the line AB than the one to the



Asymptote.

left of it; if, therefore, a curve is traced through these points (the curve is called the *conchoid*), it must continually approach the line AB. On the other hand, it is evident that the curve can never meet AB at any finite distance; for a line drawn from C to any point in AB, however distant that point, must, when produced, cross AB. AB is thus an asymptote to the curve. To the senses, indeed, the curve and line soon become one, because all lines actually drawn have breadth. It is only of *mathematical* lines that the proposition is true; and the truth of it has to be conceived by an effort of pure reason, for it cannot be represented. An asymptote may also be curvilinear. For example, certain spirals have a circle as their asymptote. The spiral continually approaches the circle, but never meets it.

Atacama is a desert region in Chile, extending into Bolivia, and includes the Chilean province of Antofagasta and part of the province of Atacama. From the steep coast, almost inaccessible to ships, the land rises in rocky plateaus broken by precipitous mountain-chains, and inland reaches from 10,000 to 18,000 feet, many of the summits being volcanoes. Though lofty, it is not on the whole a mountainous country; in almost all parts of it there are salt marshes and lagoons. The rainfall

is very scanty and fresh water excessively scarce, so that only the hardiest of desert plants are found on the bare rocky soil, which is mostly uninhabitable by human beings. The mineral wealth, especially in silver and copper, is great. Formerly the greater part of the desert belonged to Bolivia, but since the war of 1884 Bolivia retains only the small part incorporated with the province of Potosí, the remainder being ceded to Chile.—The northern Chilean province of Atacama, south of Antofagasta, is only partly desert, but is mostly stony, ill-watered, and barren. The area is about 30,700 sq. m., with a population of 40,000. Copper and silver are largely wrought; gold, nickel, cobalt, and iron are also found; and salt, saltpetre, borax, and sulphate of lime are very abundant. Copiapó, the capital, was wrecked by earthquakes in 1922.

Ata'camite, a basic chloride of copper, named from Atacama, where it has been found abundantly, but mined in other parts of Chile, in Saxony, and elsewhere. It occurs as a crust on the lavas of Vesuvius and Etna. The natural varieties of atacamite are crystallised, massive, and pulverulent or granular. It is a rich and productive ore, containing about 55 to 60 per cent. of copper. See COPPER.

Atacinus. See VARRO (PUBLIUS TERENTIUS).

Atahualpa, last of the Incas, was the favourite son of Huayna Capac, who died in 1525. The mother of Atahualpa not being of the pure Inca blood, her son was formally excluded from inheriting the throne; but on his death-bed the father assigned to Atahualpa the kingdom of Quito (recently conquered), while Huascar, his eldest son, obtained Peru. After some years, Huascar demanded homage for the kingdom of Quito, and war was declared between the brothers. In 1532 Huascar was completely defeated near Cuzco and taken prisoner. In the meantime, the Spaniards had disembarked; and after a perilous march through the unknown country, Pizarro, at the head of his two hundred cavaliers, approached the victorious camp of Atahualpa. By a daring but diabolical stratagem, Pizarro obtained possession of the person of the king, who had come by invitation to visit him in a friendly spirit. While a priest was explaining the Christian religion, at a sudden signal, the mysterious firearms poured death into the terrified masses of Peruvians, and the Spanish cavalry rode them down with merciless fury. Atahualpa, made a captive, agreed to pay an enormous ransom; but was accused of plotting against Pizarro, tried, and condemned to be burnt. On his agreeing to be 'baptised,' his sentence was commuted to death by strangulation (1533).

Atalan'ta, the name of two heroines in Greek mythology, often confounded with each other. (1) The Arcadian Atalanta, daughter of Iasus and Clymene. At her birth she was exposed by her father, who had wished for a son, but she was suckled by a she-bear, and grew up to be a maiden-huntress of marvellous courage and skill. She slew the centaurs who pursued her, afterwards sailed with the Argonauts to Colchis, and took a prominent part in the chase of the Calydonian boar. She had many suitors, but was merciless in the conditions which she imposed on them. Being the swiftest of mortals, she offered to become the wife of him that should outstrip her—the penalty of defeat being death. At length Milanion obtained from Venus three golden apples, which he dropped one after another during the race; and Atalanta was so charmed by their beauty that she could not refrain from stopping to gather them, and so lost. See Swinburne's *Atalanta in Calydon.* The same story is told of (2) the Bœotian Atalanta, daughter of Schœnus and wife of Hippomenes.

Ataman. See HETMAN, COSSACKS.

Atargatis. See DERKETO.

Atavism (Lat. *atăvus,* 'ancestor'), or REVERSION, the reappearance of ancestral instead of parental characteristics. (1) When two pure breeds are crossed, the hybrids often take after one of the two parents as regards the characters in which they were contrasted; and if these hybrids are bred among themselves, their offspring are sometimes divisible into three sets—a fourth of them like the grandsire, a fourth of them like the grand-dam, and half of them like the parent. In this we have a simple kind of reversion, which is known as Mendelian (see MENDEL). (2) When a number of different kinds of domestic rabbits of different colours are allowed to breed without restriction, there may be in the progeny in the course of time a general return to the colour of the wild rabbit which is the common ancestor. It is now generally believed, as the result of Mendelian experiments, that this kind of reversion is due to the coming together again of colour-factors which were sifted out in the formation of the various domesticated breeds. (3) Many believe, however, that reversion may also be due to the sudden reassertion of hereditary features which have lain for many generations latent. Thus a cross between a Shetland and a Welsh pony is described, in which tail, mane, and head had reverted to the type of Prjevalsky's horse of Central Asia. See DARWINIAN THEORY, HEREDITY, HYBRID, MENDEL, VARIATION, Darwin's *Animals and Plants under Domestication,* and Bateson's *Mendel's Principles of Heredity.*

Atawulf. See GOTHS.

Ataxia, LOCOMOTOR. See LOCOMOTOR ATAXIA.

At'bara, a tributary of the Nile, rises in Abyssinia near Lake Tzana, flows mainly north-west, and after receiving the larger Takazze, joins the Nile below Berber—being the only tributary of the Nile below the junction of the White with the Blue Nile. There on 8th April 1898 the Khalifa's forces were defeated by the Anglo-Egyptian army under Kitchener. The Sudan railway had just reached the Atbara in the summer of 1898. The extension to Khartum soon followed, and an iron bridge of 1200 feet in length now spans the Atbara. Another line (1905) runs to Port Sudan. See NILE, EGYPT.

Atchafalaya, an outlet of the Red River or of the Mississippi, which reaches the Gulf of Mexico at Atchafalaya Bay after a course of 220 miles.

Atchin (Dutch *Atjeh*), until 1873 an independent state in north-west Sumatra, now a province of the Dutch Indies, with an area of 21,500 sq. m., and a population of 740,000. The surface is divided into an eastern and a western half by the mountain-chain which traverses the whole island, and which rises in Abong-Abong to 11,000 feet. On both sides are numerous stretches of level or undulating soil, watered by small but deep streams, and admirably adapted for arboriculture, gardening, and the cultivation of rice. The flora and fauna agree with those of Sumatra generally; pepper and areca-nuts are characteristic. The natives employ themselves in agriculture, cattle-rearing, trade, fisheries, weaving cloth, and working in gold, silver, and iron. In appearance, dress, character, and manners, they are distinct from the rest of the inhabitants of Sumatra. Of darker colour and lower stature than the latter, they are also more active and industrious, good seamen and soldiers; but they are treacherous, revengeful, bloodthirsty, immoral, and inordinately addicted

to opium. Their ethnological place is not yet settled; their speech, according to Van der Berg, belongs to the Polynesian family.

The capital of the government is Kota Radja or Atchin, in the north-western extremity, situated on a stream navigable by boats, about 4½ miles from its port Oleh-leh, with which, since 1876, it has been connected by a railway. Formerly a large and flourishing city, it was almost entirely destroyed during the war, but is now beginning to revive.

During the earlier half of the 17th century Atchin was a powerful sultanate, with supremacy over several islands and a part of the Malay Peninsula. Its power gradually declined; but an attempt was made by the treaty between the English and the Dutch in 1824 to reserve its independence. The inevitable war, however, broke out in 1873, and ended as inevitably, though not without a desperate resistance, in the conquest and annexation of the sultanate. The resistance was not wholly overcome till 1908; by 1895 it had cost £20,000,000 and 80,000 lives. See Snouck-Hurgronje, *The Achenese* (trans. 1906).

Atchison, a city of Kansas, U.S., on the left bank of the Missouri, 333 miles above St Louis. It is an important railway centre, about a dozen lines converging here, one of them the Atchison, Topeka, and Santa Fé (New Mexico). The city has flour-mills, factories of many kinds, and an extensive trade in flour, grain, lumber, and live-stock. Pop. (1870) 7054; (1890) 13,963; (1920) 12,630; (1925, state census) 15,028.

A'te, according to Homer, the daughter of Zeus —of Eris, as Hesiod says—was a vengeful goddess, ever attending *dysnomia*, or transgression of law, though she herself prompted men to such. She was banished from Olympus by Zeus, whom she had incited to take an oath of which he subsequently repented. She then travelled to and fro over the earth with great rapidity, always intent on exercising a pernicious influence upon mankind. But her steps were followed by the goddesses *Litai* ('prayers'), benevolent daughters of Zeus, who healed those who had been afflicted by Ate. The tragic writers describe Ate as the goddess of retribution. Their representations almost identify her with Nemesis and Erinnys. Of the greater tragedians she is most prominent in Æschylus, and least in Euripides, in whom the idea of *Dikē* ('justice') is more fully developed.

Ateles. See SPIDER-MONKEY.

Ateliers Nationaux, or NATIONAL WORKSHOPS, was the name given to the works which were organised by the Provisional Government at Paris in the spring of 1848, after the downfall of Louis-Philippe, and which were intended to give occupation to the unemployed at that time of disturbance. A permanent department was established, called *The Committee of the Government for the Workmen.* This establishment acted on the doctrine that the workmen were entitled to have a living provided for them on a certain uniform scale, which was fixed at two francs per day. It should be said, however, that the works were mostly unproductive, and therefore a mere burden on the national revenue. Of the crowds which flocked for employment, both from Paris and the provinces, many could not be provided with work of any kind, and had a dole of one franc a day given them. By the time a regular government had been established at the beginning of May (1848), the numbers thus engaged had increased to 130,000. As it had become a serious tax on the revenue, the government proceeded to break up the *workshops*, a measure which kindled into flame the discontent fermenting in the capital. The armed insurrection of the lower classes of Paris which ensued, was put down by the national forces under Cavaignac only after the terrible fighting of the *Days of June.* The *ateliers nationaux* are generally, but quite inaccurately, confounded with the *ateliers sociaux* of Louis Blanc (q.v.).

Atella'næ, *Fabulæ Atellanæ* (also styled *Ludi Osci*), a kind of popular drama in Rome, first introduced from Atella, a town in Campania, between Capua and Naples. After the Greek drama had been brought to Rome by Livius Andronicus, the old *Fabulæ Atellanæ* were still retained as interludes and after-pieces. They are not to be confounded with the Greek satiric drama, although the character of both was to some extent the same. In the latter, satyrs figured; while the former personated real Oscan characters. The *Maccus* and *Bucco* of the *Fabulæ Atellanæ* may be considered the origin of the modern Italian *arlecchino* (harlequin), and other characters of the same stamp. They were the favourite characters; spoke the Oscan dialect, and excited laughter by its quaint old-fashioned words and phrases. The Atellanæ were neither so dignified as the *comœdia prætextata*, nor so low as the *comœdia tabernaria*, but were characterised by a genial and decent drollery. The caricature was at first always pleasant, and though quizzical, it did not lapse into obscenity, like the *mimi.* Respectable Roman youths, who could not appear as actors in the regular Greek drama without losing caste, were allowed to take parts in the Atellanæ. They were commonly divided into five acts, between which were frequently inserted the *exodiæ*, old-fashioned and laughable interludes in verses. The latter also were played by young and well-born Romans.

See the fragments in Ribbeck's *Scenicæ Romanorum Poesis Fragmenta* (1874; collected after Bothe and Munk); Munk, *De Fabulis Atellanis* (1840); and the articles FARCE, DRAMA.

Ateshga ('place of fire'), a spot about a mile in diameter, on the peninsula of Apsheron, on the west coast of the Caspian Sea. It was considered sacred by the Guebres, or Persian Fire-worshippers, some of whom used till recently to visit it, and bow before the holy flames which issued from the bituminous soil. The site of a former temple of this sect is now occupied by large petroleum works, where the natural gas is utilised for fuel for the vast retorts.

Ates'sa, a town of South Italy, 23 miles SSE. of Chieti. It has a beautiful collegiate church, and some woollen manufactures. Pop. 5000.

Ateu'chus. See SCARABÆUS.

Ath, or AATH, a fortified town in the province of Hainault, Belgium, on the navigable Dender, 32 miles SW. of Brussels. It has a lofty tower dating from 1150, a 17th-century town-hall, important manufactures of linen, calicoes, lace, &c., and a brisk trade. Pop. 11,000.

Athabaska (locally *La Biche*, 'red-deer or elk river'), a river and lake in the Canadian provinces of Saskatchewan and Alberta, forming part of the great basin of the Mackenzie. The river rises in the Rocky Mountains, on Mount Athabaska (11,500 ft.), close to the source of the North Saskatchewan, and passes through Lake Jasper. Its general course is NE., till, after crossing the west end of Lake Athabaska, it turns towards the NW., and unites with the Peace River, from beyond the Rocky Mountains, to form the Slave River, which, again, after passing through Great Slave Lake, takes the name of the Mackenzie. Length of the Athabaska, 765 miles; or over 2000 miles for the entire course to the sea. The Athabaska-Mackenzie affords magnificent facilities for navigation;

and between it and the Winnipeg system there is but one portage of 50 miles. Lake Athabaska receives nearly all its waters from the Athabaska River; and its principal feeder traverses not its length but its breadth, and that not in its middle, but at its extremity. The lake is about 200 miles long, and from 5 to 35 broad with an area of 2840 sq. m. It was discovered in 1771 by Samuel Hearne, and named by him Lake of the Hills. Trading stations were soon afterwards established on its shores. A silting-up process has been going on, from its numerous water-courses. — ATHABASCA was the name of one of the four divisions of the Canadian North-west, as defined in 1882, between British Columbia and the 100th meridian of W. long. It contained the fertile Peace River district. In 1905 it was abolished (as also Assiniboia) and its territory divided between the two newly delimited provinces of Alberta and Saskatchewan (q.v.).

Athaliah, daughter of Ahab, king of Israel, and queen of Jehoram of Judah, whose usurping and bloody reign (2 Kings xi.; 2 Chron. xxii., xxiii.), put an end to by Jehu, was the subject of a tragedy by Racine and an oratorio by Handel.

Athanaric was a ruler of the Visigoths who fought unsuccessfully with Valens (369), and, defeated by the Huns (376), took refuge with Theodosius, only to die a fortnight after his reception in Constantinople (381). See GOTHS.

Athanasian Creed — more accurately described in the rubric of the Prayer-book as 'the Confession of our Christian Faith commonly called the Creed of St Athanasius'—is one of the doctrinal standards of the Western Church, and was preserved by the Reformed Church of England. It is appointed to be 'sung or said at Morning Prayer, instead of the Apostles' Creed,' on thirteen festivals, including Christmas, Easter, and Whitsunday. The 8th Article declares that 'Athanasius's Creed,' together with the Nicene Creed and 'that which is commonly called the Apostles' Creed,' 'ought thoroughly to be received and believed, for they may be proved by most certain warrants of Holy Scripture.' When in the 17th century its Athanasian authorship was finally abandoned no slight wound was inflicted on its prestige, and the objections which its 'damnatory' or 'monitory' clauses naturally provoked in Christian minds were the more freely expressed. Its obvious unfitness for use as a congregational formulary could not but appeal to a clergy trained in the pastoral tradition of the English Church.

Waterland's conclusions are now endorsed by students both at home and abroad, and his treatise, *A Critical History of the Athanasian Creed* (1723), remains the completest work on the subject. It is now agreed that the *Quicunque* must be referred to the 6th, perhaps even to the 5th, century; that it was composed in its present form in Gaul, almost certainly by a member of the famous monastery of Lérins; that it was primarily designed as a didactic formulary for the use of the clergy; that it came into more public use first as a 'psalm' or 'canticle,' and thus found its way into the service-books of the Western Church; that it was originally anonymous, but at an early date was ascribed to Athanasius, obviously because his name was symbolic of orthodoxy as opposed to heresy; that the credit of this great name enhanced its authority and facilitated its acceptance; that in the course of the middle ages repeated efforts were made to popularise it by means of vernacular and metrical renderings for the use of the laity; that its liturgical use was restricted to the monastic offices until the Reformation, when for the first time its public recitation by general congregations was ordered by the rubrics of the Prayer-book.

The Church of England and the Colonial churches immediately dependent on it alone require the public recitation of the creed. In Ireland the disestablished church removed the rubric ordering its public use, but retained the creed in the Prayer-book. The Protestant Episcopal Church in the United States of America has removed the creed altogether from its Prayer-book, and amended the 8th Article accordingly. In the Church of England the chronic controversy as to the public use of the creed entered on a new phase since the issue of Royal Letters of Business to the Convocations authorised an attempt to revise the Prayer-book. The Upper House of the Southern Convocation in 1905 passed resolutions as follows: '1. That this House is resolved to maintain unimpaired the Catholic faith in the Holy Trinity and in the Incarnation, as contained in the Apostles' and Nicene Creeds and in the *Quicunque Vult*, and regards the faith thus presented, both in statements of doctrine and in statements of fact, as the necessary basis on which the teaching of the church reposes. 2. That this House, . . . while it believes that this scriptural truth is what the minatory clauses of the *Quicunque Vult* were primarily intended to express, acknowledges nevertheless that, in their *primâ facie* meaning and in the mind of many that hear them, those clauses convey a more unqualified statement than Scripture warrants, and one which is not consonant with the language of the greatest teachers of the church.' The Pan-Anglican Conference at Lambeth (1908) resolved as to the liturgical use of the *Quicunque Vult*, 'that, inasmuch as the use or disuse of this hymn is not a term of communion, the several churches of the Anglican communion may rightly decide for themselves what in their varying circumstances is desirable; but the Conference urges that, if any change of rule or usage is made, full regard should be had to the maintenance of the Catholic faith in its integrity.' In accordance with another resolution, the Archbishop of Canterbury in 1909 appointed a committee of 'seven eminent scholars and theologians,' under the chairmanship of the Bishop of Salisbury (Dr John Wordsworth), to provide a new translation based on the best Latin text, published in 1910. A committee of the Lower House of the Southern Convocation recommended that the rubric be made optional—a proposal rejected by the House in 1909.

Both sides in the controversy have become more uncompromising. Objection is now taken to the 'damnatory clauses,' not merely as being crude and lacking in charity, but as being false. The relatively barbarous character of 6th and even 5th century Christianity is insisted upon, and the authority of an alleged Catholic consent is traversed by the indictment against the whole spirit and policy of intolerant orthodoxy. Nor is objection limited to the 'damnatory clauses,' but extends to the conception of 'the Catholic faith' as essentially a dogmatic scheme, and not, as the New Testament appears to teach, a spiritual attitude involving moral fidelity. The intellectual tendencies of the age are no longer moving in the direction of theological definition, and the creed seems to answer to no evident or realised demand. On the other hand, the champions of the creed are able to draw to their side the large amount of disturbed conservative opinion which has been alarmed by the rapid progress of critical doctrines as to Scripture, and the resultant innovations in traditional beliefs. And they appear able to command a certain sympathy among the more advanced historical critics, who find less cause for disliking the *Quicunque Vult*, which is mainly metaphysical, than either the Nicene or the Apostles' Creed, which are mainly historical.

In many parish churches it is alleged that the

rubric is regularly disregarded, the creed being never read; in a large and increasing number of churches the creed is read at a service which has ceased to be popular, and thus has returned to something like its medieval position, when it was only rehearsed at the monastic office of Prime. The real difficulty now is no more with the congregations but with the ordination candidates; but even here the situation is not so acute as it was. The solution proposed in the Prayer Book Measure of 1927 was twofold. A revised translation was offered, and the reading of the creed was to be optional. Other issues, however, overshadowed this. See PRAYER (BOOK OF COMMON).

See Waterland, *A Critical History of the Athanasian Creed* (1723); Swainson, *The Nicene and Apostles' Creeds*, &c. (1875); three works on the Athanasian Creed by Ommanney (1875-97); books on it by Burn (1896 and 1899), and also by Robinson (1905), Jayne (1905), and Emery Barnes (1905); Gibson, *The Three Creeds* (1909).

Athanasius, bishop of Alexandria and champion of Christian orthodoxy, was born, apparently in Alexandria, about 296 A.D., and seems to have been brought up under the immediate supervision of Alexander, bishop and patriarch of Alexandria, whose secretary he became. Athanasius accompanied his bishop to the council of Nicæa (325 A.D.), and helped (though only in deacon's orders) to move the council to decide against the views of Arius (q.v.), and to mould that definition of the Christian faith of which he was to be the protagonist. See CHRIST, CREEDS, TRINITY.

His patron, Alexander, having died in the following year, he was duly elected to the primacy by the clergy and people; and was but newly installed in his office, when Arius, who had been banished at the time of the condemnation of his doctrine at Nicæa, was recalled. Athanasius, it is said, refused on this occasion to comply with the will of the emperor that the heretic should be restored to communion. On this account, and in consequence of several other charges brought against him by the Arian party, he was summoned by the Emperor Constantine to appear before the synod of Tyre, in 335 A.D., which deposed him from his office. The sentence was confirmed by the synod of Jerusalem in the following year, when he was banished to Augusta Trevirorum (Trier). In 337, however, he was recalled from his banishment, and restored to the primacy at Alexandria. His entrance into the city was like a triumphal procession; but the Arians soon rose against him; he went into exile, and (in 341) he was again condemned by a council of ninety-seven (mainly Arian) bishops, assembled at Antioch. Against this decision a protest was made by a hundred orthodox bishops at Alexandria; and in a council held at Sardica (343), 300 bishops, countenanced by Julius, Bishop of Rome, confirmed the decision in favour of Athanasius, who was again replaced in his office (346). The Arians once more acquired the ascendency after Constantius (in 353) had been made emperor of both the East and the West; for in that year Athanasius was condemned by a council held at Arles, and the sentence was confirmed by another held at Milan in 355, the influence of the sovereign being strongly exerted to secure his condemnation. As the resolute patriarch had declared that he would not leave his place without an express order from the emperor, violent means were resorted to for his expulsion. While engaged in conducting divine service, he was interrupted by a company of soldiers (356) from whom he made his escape into the Egyptian desert. A price was set on his head; and to avoid his persecutors, he retired from the usual haunts of the anchorites to a remote desert in Upper Egypt, where he was attended by but one faithful follower. Here he wrote several works to confirm orthodox Christians in their faith. On the accession of Julian to the imperial throne, toleration was proclaimed to all religions, and Athanasius returned to his former position as Patriarch of Alexandria (362). His next controversy was with the heathen subjects of Julian, to whom the patriarch, by his zeal in opposing their religion, had made himself very offensive. To save his life, he was compelled again to flee from Alexandria, and remained concealed in the Theban desert until 363, when Jovian ascended the throne. After holding office again as patriarch for only a short space of time, he was expelled anew by the Arians, under the Emperor Valens. Athanasius now found refuge in the tomb of his father, where he remained hidden four months, until Valens, moved by petitions from the orthodox Alexandrians, restored the patriarch to his see, in which he continued till his death in 373 A.D.

Athanasius was the leading ecclesiastic during the most trying period in the history of the early Christian Church. His ability, his conscientiousness, his judiciousness and wisdom, his fearlessness in the storms of opposition, his activity and patience, all mark him out as a conspicuous ornament of his age. Though twenty years of his life were spent either in exile, or what was equivalent to it, yet his prudence and steadfastness, combined with the support of a large party, crowned his exertions with complete success.

His writings are polemical, historical, and moral; the polemical works treat chiefly of the doctrines of the Trinity, the incarnation of Christ, and the divinity of the Holy Spirit. The first edition of his works in Greek (2 vols. folio) appeared in 1600; better are those by Montfaucon (1698) and Migne (1860). Some of the treatises were translated by Parker (1713), Whiston (1713), and Newman (1842). See the church histories; Harnack's *History of Dogma;* Stanley's *Eastern Churches;* also works on Athanasius by Möhler (2nd ed. 1844), Böhringer (2nd ed. 1874), and R. W. Bush (1888); Bright's edition of the Orations against the Arians; A. Robertson's *Select Works and Letters of Athanasius* (1892); Bright's article in Smith's *Dict. Eccles. Biog.*, and the articles in Hauck-Herzog (1897) and the *Catholic Encyclopædia* (1907); also the article ARIUS.

Atharvaveda. See VEDA.

Atheism is the doctrine that there is no God. But it makes all the difference whether a man actually professes atheism, or whether he is merely charged with atheism by his opponents. There are atheists who have distinctly denied the existence of God; very many more have only refused to believe in a god or gods because the difficulties in the way of that belief were in their mind stronger than the arguments in favour of it. But the vast majority of those who have been charged with atheism repudiated the impeachment. Their enemies usually insisted that their opinions implied disbelief in the god or gods whom their neighbours worshipped. 'Infidel' and 'atheist' sank to terms of abuse for heretics; in the last resort a man might be called a 'practical atheist' if he abstained from the religious rites the majority held to be incumbent. Socrates was accused of atheism; so were the early Christians because they denied the pagan gods. Thomas Paine, a resolute deist, was constantly called an atheist; J. G. Holyoake, a secularist, was the last man imprisoned on a charge of atheism in England (1841); Bradlaugh did not always reject the name of atheist, but both he and Ingersoll were rather agnostic freethinkers than atheists. The word atheism, which first appears in English literature in the latter part of the 16th century, is used as if familiar in Bacon's works. The name atheist is said to have been first applied in Greek literature to one of the followers of the materialistic philosopher Democritus (q.v.). It used to be doubted by

such men as Bacon, Addison, and Dr Arnold whether a real atheist ever existed. According to Spencer and Gillon many of the central Australian tribes are professed atheists. The children are taught to believe in a great all-powerful spirit; but the boys at initiation are warned that there is no such being—that it is a myth invented by the men to frighten and keep in order the women and children. The ancient Greeks banished the recognised abettors of atheism with this stigma attached to them, the names of men who did not believe in the gods. In recent and modern times such men as La Mettrie, Von Holbach, Feuerbach, and Gustave Flourens—to name no others—have advocated this doctrine in the most explicit manner; and when, for example, Feuerbach says: 'It is clear as the sun, and as evident as the day, that there is no God;' or, when Flourens wrote these words: 'Our enemy is God' . . . 'Hatred of God is the beginning of wisdom' . . . 'If mankind would make true progress, it must be on the basis of atheism,' there seems no reason to doubt that their language may be regarded as expressing their real sentiments.

There are three forms of argument employed in the advocacy of atheism—viz. the *dogmatic*, which positively asserts that there is no God; the *sceptical*, which maintains that the finite mind of man is incapable of ascertaining whether there is a Divine Being or not; and the *critical*, which holds that the evidences adduced in support of Theism (q.v.) are inadequate. The first of these—the dogmatic—has now fallen largely into disrepute. In Britain, this is largely owing to the trenchant reasoning of John Foster, and subsequently of Dr Chalmers. These writers set themselves to show that dogmatic atheism is a palpable absurdity. Before any man is entitled to assert that there is no evidence of the existence of God, he must, they argue, explore all parts of the universe; for evidence that would convince even *him* may be extant somewhere. To prove a negative is proverbially difficult; but to prove *this* one, nothing short of omniscience and omnipresence would be requisite. Modern non-believers in the existence of God cautiously restrict themselves to the sceptical and the critical methods, and, instead of positively asserting that there is no God, they argue in favour of Agnosticism (q.v.). The relation of atheists to oaths in courts and in parliament is discussed at OATHS. See also APOLOGETICS, RELIGION, MATERIALISM, POSITIVISM, SECULARISM.

Atheling (Old Eng. *æthel*, 'noble'), a title of honour among the Anglo-Saxons, which, at first applied to the descendants of the primitive nobles of the first settlement, gradually became confined to the princes of the blood royal, and, in the 9th and 10th centuries, exclusively to the sons and brothers of the reigning king.

Ath'elney, ISLE OF, a marsh at the junction of the rivers Tone and Parret, in the middle of Somersetshire, about 7 miles from Taunton. Here Alfred hid himself for nearly a year when driven from his throne by the Danes in 878, and here he founded, in 888, a Benedictine abbey, now entirely gone. Among the many relics found in this spot is a jewel of Alfred's, preserved in the Oxford Museum. The name Athelney means 'island of the nobles,' or 'royal island.'

Athelstan, son of King Edward the Elder, and grandson of Alfred the Great, was born about 895 A.D., and was crowned king of the Mercians and West Saxons at Kingston-upon-Thames in 924. He conquered portions of Cornwall and Wales, and, on the death of Sihtric, king of Northumbria, who had married one of his daughters, made his successor tributary. In 937, a league, composed of Welsh, Scots, and Danes, was formed against him; and a fierce and decisive battle was fought at Brunanburh (q.v.), in which the allies were utterly defeated, and which became famous in old English song. After this, the reputation of Athelstan, now practically king of all England, spread into the Continent; one of his sisters married Otto the Great, afterwards emperor; another, Hugh, Duke of the French, father of Hugh Capet. At home he exhibited a deep interest in the welfare of his people, improved the laws, built monasteries, and promoted commerce. He died in 939.

Athena, or PALLAS ATHENA, one of the greater Greek divinities, forming, with Zeus and Apollo, the supreme triad in Greek mythology. Of her origin and parentage different accounts are given, probably from the confusion of various local legends; but the best-known version of the myth represented her as the daughter of Zeus and Mētis. Zeus, we are told, when he had attained supreme power after his victory over the Titans, chose for his first wife Metis ('wisdom'); but being advised by both Uranus ('heaven') and Gæa ('earth'), he swallowed her when she was pregnant with Athena. When the time came that Athena should have been born, Zeus felt great pains in his head, and caused Hephæstus (Vulcan) to split it with an axe, whereupon the goddess sprang forth—fully armed, according to the later stories. Under the gross accretions which conceal the significance of the myth, we may see in this account of Athena's parentage an effort to set forth a divine symbol of the combination of power and wisdom. Her father was the greatest, her mother the wisest of the gods. She is literally born of both, and so their qualities harmoniously blend in her. She is the personified reason, the wisdom of the divine father; while Apollo, no less beloved of Zeus, is his mouth, the revealer of his counsel. She is a maiden goddess, everlastingly young and fair. Though her heart is inaccessible to the passion of love, she is not a cold unfeeling divinity, but interests herself warmly in the affairs of both gods and men. She is the patroness of agriculture, the inventor of the plough and rake, the first to introduce the olive into Attica, and (in harmony with her character as the personification of active wisdom) to teach men the use of almost all the implements of industry and art; and she is said to have devised nearly all feminine employments. Philosophy, poetry, and oratory are also under her care. She is the especial patroness of the Athenian state, protects its liberties by her power and wisdom, maintains the authority of law and justice in her courts, and was believed to have instituted the court of justice on Mars' Hill (the Areopagus). The industries of its citizens are dear to her—she is the 'workmistress' (*Ergane*), the goddess of all useful and elegant arts. As a warlike divinity, she approves of those wars only which are undertaken for the public good, and conducted with prudence; and thus she is regarded as the protectress in battle of those heroes who are distinguished as well for their wisdom as their valour. In the Trojan wars she favoured the Greeks, and in the war of Zeus against the giants she assisted her father with her counsel, killed the giant Pallas, and buried Enceladus under the island of Sicily. Her worship was universal in Greece, and representations of her in statues, busts, coins, reliefs, and vase-paintings are numerous. She is always dressed, generally in a Spartan tunic, with a cloak over it, and wears a helmet adorned with figures of different animals; her ægis, the round Argolic shield, has in its centre the head of Medusa. Her countenance is beautiful, earnest, and thoughtful, and the whole figure

majestic. One of the two masterpieces of Phidias was his great statue of the virgin Athena, on the Parthenon at Athens. In it were combined chastity with gentleness, victorious strength with calm peace, profound wisdom with perfect simplicity. It was not only a production of the highest art, but at the same time the expression of a profound religious idea. From Greece her worship was carried to greater Greece, and many temples were erected in her honour. In Italy proper she was identified with Minerva, a native goddess of wisdom, and worshipped with Jupiter and Juno.

Athenæ'um (Gr. *Athēnaion*), originally a Temple of Athena (Lat. *Minerva*), afterwards a kind of college or institution for higher education. The first at Rome was that founded by the Emperor Hadrian about 133, for the study of poetry and rhetoric, with a regular staff of professors. It existed as the *Schola Romana* until the 5th century. Similar institutions flourished in the provinces also, as at Lyons and Nîmes. Theodosius II. founded one at Constantinople for the eastern world. In modern times the name has been revived as an appellation for certain literary institutions, as that at Marseilles, and also as a collective title for literary essays and reviews. The weekly journal of literature, science, and art (monthly, January 1916–April 1919), published in London from 1828, was combined with *The Nation* in 1921. See CLUBS.

Athenæ'us, a Greek writer, born at Naucratis in Egypt. He lived first at Alexandria and afterwards at Rome about the close of the 2d and beginning of the 3d century. His work, entitled *Deipnosophistæ* ('Banquet of the Learned'), in fifteen books, but of which we possess only the first two, and parts of the third, eleventh, and fifteenth, in an abridged form, is very interesting as one of the earliest collections of *Ana*. It consists of extracts from more than 1500 books, put in the form of table-talk at an imaginary banquet, at which Galen the physician and Ulpian the jurist are among the guests. Every possible subject is introduced and illustrated by fragments from the poets, dramatists, and philosophers; but of the learned author's thousand and one interests, gastronomy seems to have been the dearest. But he loved 'titbits' of scandal no less than of cookery, for he tells many stories to the discredit of people whom history praises, which of course we are not by any means bound to believe. His dialogue is prolix and lumbering; and his work is not irradiated by a single gleam of genius, and has only achieved immortality through being a storehouse of miscellaneous information that otherwise would have been lost. The best editions are by Schweighäuser (14 vols. 1801–7), Dindorf (3 vols. 1827), Meineke (4 vols. 1859–67), and Kaibel (1887–90). An English translation by C. B. Gulick, with text (6 vols.) was begun in 1927.

Athenag'oras, an early Christian philosopher, who taught first at Athens, and afterwards at Alexandria. He is the most elegant writer among the so-called apologists in the second half of the 2d century, and we possess two writings from his pen—his *Legatio pro Christianis*, addressed to the Emperor Marcus Aurelius and his son Commodus, composed about 163, and *De Resurrectione Mortuorum*, written about 180. In these he defends the Christians against the heathen charges of atheism, incest, and cannibalism with great clearness and convincing power.

Athena'is, an Athenian lady of distinguished beauty and learning, who in 421 A.D. became the wife of the Emperor Theodosius II., and assumed the name of Eudocia (q.v.).

Athens, capital of old Attica, metropolis of ancient Greek culture, and still capital of the republic of Greece, seems to have derived its name from Athena (q.v.), 'goddess of science, arts, and arms,' who from earliest times was the patron divinity of the city. Cecropia, from the mythical king and hero Cecrops, the city was also called in ancient times.

Athens owes its original location, doubtless, to the craggy rock known as the Acropolis (q.v.), that rises about 230 feet above the Attic plain, and that in earliest days served for citadel as well as for residence and site of sanctuaries. With the growth of the population, the parts below and adjacent to the Acropolis, especially on the western and southern slopes, became inhabited. Possibly prior to the occupation of the Acropolis and before what is known as the Mycenæan age, there was a settlement on the seaward slopes of the hill known as the Pnyx, numerous remains of which, in the form of cellars, cisterns, graves, steps, seats, all cut into the native rock, are still to be seen, constituting what is generally known as 'The Rock City.' This settlement (not now held to have been Phœnician) was in later times never wholly deserted. It appears to have been included within the circumference of the city walls, and at the time of the Peloponnesian war, when the people of Attica sought shelter within the fortifications, this quarter must again have been thickly inhabited.

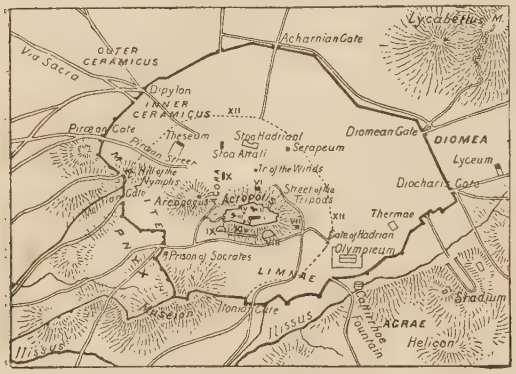
To understand the subsequent history and growth of Athens, it is necessary first to take into view the natural advantages of its position. Few cities, if any, can boast a more beautiful situation.

The Attic plain, which immediately surrounds the city on the east, north, and west, is bounded by the range of Hymettus (3368 feet), famous for its purple tints, on the east; by Pentelicus (3641 feet), noted for its quarries of marble, rich even to-day, on the north-east; by the range of Parnes (4634 feet), well wooded at the base, but barren at the summit, on the north; by the lower and nearer range of Corydallus (1535 feet), extending to the bay of Salamis, on the north-west; and on the west and south by the Saronic Gulf, in whose waters lie, in plain sight, the islands of Salamis and Ægina. The site of the city is itself diversified by several hills which add greatly to the beauty of the scenery.

Standing upon the Acropolis one sees to the east Mount Lycabettus, a conical-shaped mount 911 feet high, on whose summit Zeus once had a sanctuary where now stands a small chapel dedicated to St George, the patron saint of the modern Greeks. To the south-west rises the hill of the Muses, or the Mouseion, surmounted now by the ruins of a monument to Philopappus, who was Roman consul about 100 B.C. In the side of the Mouseion are three rocky chambers, doubtless ancient sepulchres, but popularly known as the 'Prison of Socrates,' according to a tradition that goes no farther back than the middle ages. Immediately adjacent to this is a lower eminence called the hill of the Pnyx, from the fact that on its slope tradition locates the place of popular assembly. At the upper end of the terrace, which is supported below by a wall of polygonal masonry, stands a cube of rock surrounded at the base by steps. This is now generally held to be the famous *bēma* or tribune of the assembly, from which the orators addressed the people occupying the semicircular area below, which must originally have had a slope the reverse of the present and resembled the usual inclination of the surface of the theatre.

Just below the western foot of the Acropolis lies the rocky hill called the Areopagus or hill of Ares (Mars), so named from the myth according to which Ares was tried for the murder of Halirrhothios before the twelve gods of Olympus, who held court on this

eminence. It was here that the most venerable court of Athens had its sittings to try cases of wilful murder, to exercise judicial censorship over the life of the citizens, and to guard the sanctity of



Plan of Ancient Athens:

I.	Parthenon,	Acropolis.
II.	Erechtheum,	
III.	Propylæa,	
IV.	Temple of Athena Promachus,	
V.	Temple of Athena Ergane,	
VI.	Prytaneum.	
VII.	Choragic Monument of Lysicrates.	
VIII.	Theatre of Dionysus.	
IX.	Odeum of Herod.	
X.	Stoa Pœcile.	
XI.	Sanctuary of Æsculapius.	
XII.	Circuit of the walls before the Persian war.	

ancient law and tradition, particularly such as pertained to religion. Before this court it is generally believed that the apostle Paul delivered his vindication of the Christian faith recorded in Acts, xvii. Just beyond the Areopagus, with a narrow valley between, lies the Hill of the Nymphs, once occupied by sanctuaries and dwellings, and now the site of the astronomical observatory. The view beyond includes the harbours of Phalerum, Munychia, Zea, and the Piræus (q.v.). The superior position and greater extent of the last-named harbour have made it, ever since the days of Themistocles, the seaport of Athens. To the south and east of the city flows the Ilissus, and to the north and west the less celebrated but more copious Cephissus. In the summer both streams are nearly dry, and at no time are they large enough to deserve the name of river. They are of great value, however, in the winter and spring for irrigating the vineyards and olive-groves that cover the plain. The most famous spot in the plain is the grove of the hero Academus, situated about a mile north-west of the city, where the 'divine Plato' taught his philosophy and founded his school, which has become famous under the name of the *Academy* (q.v.). Adjoining this grove is a knoll called Colonus, in the ancient *dēmos* of that name, famous as the birthplace of the tragic poet Sophocles, who celebrates the beauty of this region in one of the finest of the odes in his tragedy of *Œdipus at Colonus*. On this hillock are the tombs of two of the most distinguished of modern archæologists, Ottfried Müller and Charles Lenormant.

That a city so beautifully situated, enjoying a delightful climate the greater part of the year, under a sky wonderful for its clearness (as Euripides says of the Athenians of old, 'marching through an ether of surpassing brightness'), inhabited by a race so gifted as were the ancient Ionian Greeks, should play an important rôle in history, is not at all surprising. The history of the city may be most conveniently narrated by dividing it into four epochs: (1) The period from the time of Cecrops to the battle of Platæa, 479 B.C. (2) The most flourishing period of Athens, extending to the close of the Peloponnesian war, 403 B.C. (3) The decline of Athens, embracing the Alexandrian, Roman, Byzantine, Frankish, and Ottoman periods. (4) Modern Athens.

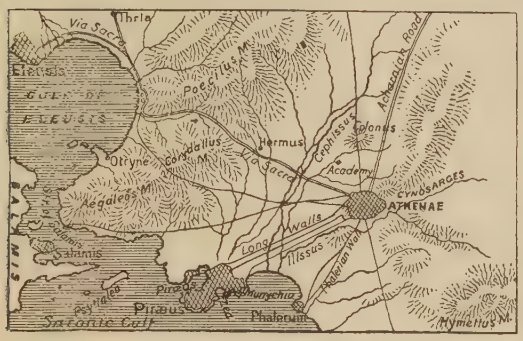
(1) The oldest history of Athens as a city is connected with the reforms of Theseus and Solon. Theseus was a mythical hero to whom, as his name may indicate, was attributed the credit of organising the scattered population of Attica into communities and of instituting several of the most important Athenian festivals. At this time the Acropolis was the abode of the king and the priests, and was the site of the Prytaneum or townhall, as well as of the sanctuaries and altars of Athena, Erechtheus, Zeus, and Poseidon.

In the 6th century B.C., under the reforms of Solon and the fostering hand of the tyrant Pisistratus, Athens fairly began her prosperous career. Amid much that is mythical in the history of the reforms of Solon, it is certain that he gave a new place to the *dēmos* as the unit and centre of political life, and to the *ekklēsia* or popular assembly, before which all acts of government were to be brought for discussion and approval. Already the populace was divided for political purposes on a property basis into four classes. Of these the first three were to be eligible to office. At this time the chief rule was already lodged in the hands of nine archons who were chosen annually. To the family of Pisistratus Athens owes the earliest structures that were at all beautiful or imposing. On the Acropolis Pisistratus adorned the ancient temple of Athena with a portico. Some remains of this structure, which was destroyed by the Persians, are still seen built into the northern wall of the Acropolis. The foundations of a temple exhumed (1885–88) between Parthenon and Erechtheum were identified by Dörpfeld as belonging to this ancient sanctuary. Still more imposing was the temple begun by Pisistratus on the bank of the Ilissus in honour of Olympian Zeus, and ever since known as the Olympiēum. Within a peribolus of four stadia a structure was reared whose dimensions afterward became 354 feet in length, 171 in breadth, and which when completed was adorned with 120 columns of Pentelic marble, 60 feet in height and 6 feet in diameter. The ruins of this colossal temple, consisting of 16 columns, most of which have an architrave, form one of the most impressive sights of Athens.

The reforms of Clisthenes about 506 B.C. gave the government of Athens a still more democratic form by setting up ten tribes on a local instead of four ancient Ionian tribes on a kinship basis, by greatly widening the franchise, and by instituting a council of 500 which prepared business for the assembly. Doubtless these reforms stimulated the erection of new buildings for the use of the state, many of which were located about the ancient Agora. The conflict with Persia which originated in the Ionic revolt and the destruction of Sardis in 499 B.C., indirectly led to the naval supremacy of Athens, under the wise guidance of Themistocles. In 480 B.C. the Athenians abandoned their city to the ruthless vengeance of the Persian invaders, who burnt and destroyed all its houses and temples.

(2) After the victories of Salamis and Platæa, the Athenians splendidly rebuilt their city, which now entered upon the most brilliant epoch of its career. Under the leadership of Themistocles, Cimon, and Pericles, Athens reached the zenith of her power, and became fortified by numerous walls and bulwarks, and beautified by the erection of splendid temples. To this period belong the walls around the Acropolis, and the city walls with their ninety-seven towers and ten gates, measuring a

circumference of forty-three stadia, or almost five miles. The chief gate was at the north-west, and led to the Academy. It was called the Dipylon or double gate, and its form may still be seen from



Map of the Country round Ancient Athens.

the foundations which have been brought to view by excavation. Just outside of this gate was the Ceramicus ('Potter's field') or ancient cemetery, where one sees to-day some of the most beautiful sepulchral reliefs known to art. For the better defence of the city and of its harbour, Piræus, the famous 'long walls' were built by Themistocles, Cimon, and Pericles. Together with the fortifications of the Piræus, which had previously been built by Themistocles, they formed a complete fortress, sometimes denominated, on account of its length, which was about five miles, the 'Long Fortress.' The enclosure between the two parallel walls was for the larger part of the way about 550 feet wide, and formed a continuous broad street between the city and its port. Traces of these walls are still to be seen. The age of Pericles in Athenian history corresponds to the Elizabethan period in the history of England. Among the great names of this illustrious period may be mentioned Mnesicles and Ictinus in architecture, Phidias and Polyclitus in sculpture, Polygnotus and Parrhasius in painting, Æschylus and Sophocles in tragedy, Aristophanes in comedy, Pindar and Simonides as lyric poets, and Herodotus and Thucydides as historians. Of the monuments of this period the most important are the Parthenon (q.v.), the Erechtheum, the Temple of Wingless Victory (*Nikē Apteros*), the Propylæa, the Theseum, and the statues and reliefs that adorned these structures. It is

View of the Acropolis of Athens from the Mouseion Hill, showing the ruins of the Parthenon and the Propylæa.

The arches belong to the ruins of the Odeum of Herodes Atticus and other buildings of the Roman period. The hill to the right is Lycabettus.

from the contemplation of these ruins and remains that the beholder gains such a conception of the purity and exquisite grace of ancient art as he can get nowhere else. The simplest and most majestic structure of all is the Parthenon, built in the Doric style, and richly ornamented with polychromatic colouring. Its cella contained the chryselephantine statue of the virgin goddess from the hand of Phidias. Its pediments were adorned with groups of statuary representing the birth of Athena, and the contest of Poseidon and Athena for the possession of Attica. The frieze around its cella wall portrayed the procession of the Panathenaic festival. Of these sculptures the largest part of what has been preserved was carried by Lord Elgin to the British Museum, where the collection is known as 'the Elgin Marbles' (q.v.). The temple first became a ruin in 1687, through the bombardment of the Venetians, one of whose lieutenants had the wretched good luck to send a bomb into the powder stored by the Turks in the cella. Shattered and battered though it is, the Parthenon is doubtless the most beautiful ruin in the world. Of the Erechtheum, which was built in the Ionic style, and which has a form entirely different from that of any other known temple, the most beautiful part, the so-called 'Porch of the Caryatides,' is still in fair state

ot preservation, and shows six graceful female figures supporting the architrave. The Propylæa, which formed the entrance to the Acropolis, consisted of three parts—viz. a central porch with five gates, and a north and south wing. It was the most massive secular structure of ancient Athens, but, probably through the distractions and expenditures of the Peloponnesian war, was never completed. Contiguous and in front of the south wing of the Propylæa is the Temple of Wingless Victory, built in the Ionic style and of Pentelic marble. On a slight elevation north-west of the Acropolis stands the so-called Theseum, the best preserved of all the structures of the ancient city. It was built somewhat earlier than the Parthenon, is also of the Doric order, and derives its name from the tradition that here the remains of Theseus were brought from the island of Scyros and interred. Most modern scholars believe it was a temple of Hephæstus. In the middle ages it served as a Christian church dedicated to St George. The gold-brown tint of the weather-stained Pentelic marble presents, in the glow of the rising or setting sun, a peculiarly beautiful effect.

In an out-of-the way corner, south-east from the Acropolis, stands the graceful Choragic Monument of Lysicrates. This monument owes its origin to the custom of dedicating the tripods given in the Dionysiac contests to the victorious chorus. It is in the form of a small circular temple, which served as the base of the tripod, and is one of the earliest specimens of the Corinthian architecture. On the south slope of the Acropolis was the sanctuary of Dionysus, where later was built the great theatre, the remains of which, consisting of seats hewn into the rock, marble thrones, pieces of a later proscenium, and other architectural fragments, still testify to the interest of the Athenians in the festivals of the god of the vine. (See THEATRE). Closely adjacent, on a higher terrace, lay the sanctuaries of Æsculapius, Themis, Aphrodite, and Demeter, of which little except the foundations remains. The rectangular Odeum of Pericles was also near.

(3) In its most flourishing period, Athens contained upwards of 10,000 dwellings, and numbered at least 100,000 free inhabitants, and more than twice as many slaves. The number of citizens who were entitled to vote and to hold office was about 20,000. The decline of Athenian power and prosperity dates from the close of the Peloponnesian war (403 B.C.), which had exhausted the resources of Athens and broken her spirit. Still, even in this later time there were not wanting patriots and statesmen, such as Demosthenes and Lycurgus, who secured for Athens a new though brief ascendency among the states of Greece, and made her the bulwark of Hellenic independence, until the fatal battle of Chæronea (338 B.C.), which established the Macedonian supremacy. Lycurgus, who stood for many years at the head of the financial administration of Athens, was most active in fortifying and building up the city. A new and magnificent arsenal in the Piræus, called after its architect the arsenal of Philon, was erected under his direction, and in Athens he built a new stage structure and lined the seats of the Dionysiac theatre with marble. On the banks of the Ilissus he laid out the Stadium, used for the first time in 330 B.C. for the games of the Panathenaic festival; it had seats for no less than 45,000 persons. He enlarged and beautified the gymnasium known as the Lyceum, where Aristotle expounded his science and philosophy. During the subsequent Macedonian occupation, Demetrius of Phalerum gave the city a wise administration. Now Athens became the seat of schools of philosophy and rhetoric, and the metropolis of polite learning. The long list of benefactors of Athens during the Alexandrian period begins with Ptolemy Philadelphus (284 B.C.), who founded a gymnasium and library which bears his name The kings of Pergamus, Attalus and Eumenes, built markets and halls and theatres, and the Syrian Antiochus Epiphanes (175 B.C.) resumed the building of the Olympiēum, which for a long time had remained half completed. With the destruction of Corinth in 146 B.C. by the Romans, and the dissolution of the Achæan League (see ACHAIA), Athens with the rest of Greece became a Roman province. Yet for a long time the conqueror Rome sat at the feet of the conquered Athens, to learn her art and letters, and to gain from her sages teachings of philosophy and rules of statesmanship. Of the buildings of this period should be named especially the Tower of the Winds, which served as a kind of public clock and barometer, built by Andronicus Cyrrhestes, and the Gate of the Agora. The Emperor Hadrian, probably no less through a desire to gratify his vanity than from a love of Greek culture, gave Athens a fresh revival of art and a new prosperity. An entire quarter of the city, south-east of the Acropolis, was named after him, as is attested by an inscription which can still be read on the 'Gate of Hadrian.' He finished the great Temple of Zeus begun by Pisistratus, which was thus more than 600 years in course of building. About the same time a wealthy Athenian, Herodes Atticus of Marathon, built, in honour of his wife Regilla, a magnificent theatre or odeum, the ruins of which rise conspicuously above all other remains of the ancient city at the foot of the Acropolis. But here is the turning-point. From this time onwards the history of Athens is only one of spoliation and destruction, first by Romans, then by Goths, then by Christians, and last by Mussulmans. The Athenians had to pay dearly for espousing the cause of King Mithradates against the Romans. After a long siege, the Romans under Sulla took Athens and plundered it of many works of art. In 267 A.D. the city was captured by the Goths. In the next century Constantinople began to draw works of art from Athens for her adornment. The schools of philosophy, especially the Neoplatonic, still maintained their existence, and were the support of pagan religion. At last the Emperor Justinian, in 529 A.D., closed by edict the Athenian schools of philosophy, and the light of science and learning that had been shining for so many centuries, though but dimly at the last, was now wholly extinguished. The temples were converted into churches, whereby they suffered many architectural changes. In 1019 the Emperor Basilius II. held in the Parthenon, now called Panagia, or the church of the Madonna, a religious celebration in gratitude for his victory over the northern barbarians. In 1204, after the conquest of Constantinople, Boniface de Montferrat became king of Greece. Athens was ruled by a succession of Frankish dukes until 1456, when the city fell into the hands of the Turks, under whose blighting despotism, with a brief interruption of Venetian ascendency, it remained until the deliverance of Greece was effected in 1833 through the intervention of the great powers of Europe.

(4) With the liberation of Greece from the yoke of Turkey begins the history of Modern Athens. Before the transfer of the capital from Nauplia by King Otto, who had been chosen to the throne of the new kingdom, Athens was a wretched village of a few hundred houses. Since that time it has enjoyed a prosperous growth. Modern Athens has been built chiefly on the eastern and northern sides of the Acropolis, while the ancient city lay chiefly on the southern and western sides, and in its public

ATLANTIC OCEAN

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buildings and newer parts it reminds one of the better-built German cities. It has a gymnasium on the German model, a girls' high school, excellent private schools, a polytechnic, and a university. Railways run to the Piræus and the Peloponnesus, to Laurium, and to Larissa and Salonika, the last connecting with the general European system. The chief business streets, 'Hermes' and 'Æolus,' cross at right angles, and divide the city into four nearly equal parts. Of modern public buildings the most noteworthy are the University; the Academy, which is built almost wholly of marble and shows with beautiful effect the polychromatic decorations of the ancient Doric style; the Exposition Hall; and the Palace, externally an ugly square building, but containing some spacious and handsome salons. Among recent erections are a magnificent national library, a theatre, and the new Stadium. All these last, as well as the Academy and the Exposition Hall, are the gifts of wealthy Greeks, residing mostly abroad. Athens has many remains of antiquity in its museums. At the eastern end of the Acropolis, the Archæological Society of Athens has erected a low building in which are preserved the remains and fragments of ancient art exhumed on the Acropolis. The most noteworthy of these are several slabs of the Parthenon frieze, reliefs from the balustrade of the Temple of Wingless Victory, fragments of the frieze of the Erechtheum, and the archaic statues found near the Erechtheum. The museum contained in the Polytechnicum embraces the Mycenæ collection made by Dr Schliemann, figurines from Tanagra, Myrina, &c., and a rich collection of vases. The National Museum is especially rich in archaic statues and in sepulchral stelés and reliefs. The Greek Archæological Society affords every facility to foreign students, and carries on excavations. Of foreign archæological schools at Athens, the French school was founded in 1846, the German Institute from 1873, and the Austrian from 1900. The American school, founded in 1882, is maintained by the co-operation of the leading colleges, and by the friends of classical studies in the United States. The British school was opened in 1886, and is under the patronage of the society for the promotion of Hellenic studies. Pop. (1907) 167,480; (1920) 300,701. It is now estimated at 700,000, swelled mainly by refugees from Turkey, and claims to be the greatest town in south-eastern Europe.

See the articles GREECE, ART, GREEK ARCHITECTURE, SCULPTURE, SOLON, PERICLES, SOCRATES, PLATO, &c.; English works on ancient Athens by Leake (new ed. 1841). E. A. Gardner (1903), Harrison and Verrall (1890), and Miss Harrison (1906); French works by Laborde (1854), Beulé (1863), and E. Burnouf (1877); German works by E. Curtius (1891), Wachsmuth (1874–90), Hertzberg (1885), and Judeich (1905); W. Scott-Ferguson, *Hellenistic Athens* (1911); M. L. D'Ooge, *The Acropolis of Athens* (1909); C. H. Weller, *Athens and its Monuments* (1914); Schede, *Die Burg von Athen* (1922); Penrose, *Principles of Athenian Architecture* (1889); the Atlas of Athens by Curtius and Kaupert (1878); De Coulanges, *The Ancient City* (trans. 1874); Capes, *University Life in Ancient Athens* (1877); W. W. Fowler, *The City State* (1893); and for the mediæval history, Gregorovius (German, 1889), Laborde (French, 1855), and Constantinides (Greek, 1876); and for modern Athens, Freeman (in his *Historical Essays*), J. A. Symonds (in his *Sketches*), and P. F. Martin (in *Greece of the Twentieth Century*, 1912).

Athens, the name of more than twenty places in the United States, including a cotton manufacturing town in Georgia, 92 miles WNW. of Augusta, the seat of the university of Georgia (1801), with a population of 17,000; and a village in the south of Ohio, on the Hocking River, seat of the Ohio University and of the state lunatic asylum.

Atherine (*Atherina*), a small food-fish, the type of a family, found in the Mediterranean, on the South of England, and in Irish waters. It is also called Sand Smelt, or even Smelt, though it is quite distinct from the last-named fish.

Atheroma. See ARTERIES.

Atherstone, a market-town of Warwickshire, 14 miles N. of Coventry by rail. Drayton was born at Hartshill, close by.

Atherton, a mining and manufacturing urban district of Lancashire, part of Leigh parliamentary borough; pop. 20,000.

Athletic Sports. The ancient Egyptians indulged in singlestick and other sports, but the first organised games were the great Greek open meetings—the Olympian, Pythian, Nemean, and Isthmian games (see OLYMPIA, PYTHIAN GAMES, NEMEA, ISTHMUS, PANATHENÆA). Milo (q.v.) was the most noted professional; and Pindar (q.v.) celebrated victors in immortal odes. In 186 B.C. M. Fulvius introduced athletic sports at Rome, where they soon deteriorated into mere gladiatorial combats. Excluding hunting, hawking, and similar pursuits of the rich, the old sports of the English people were archery, bull and bear baiting, cock-fighting, running, jumping, throwing the bar, running at the quintain, tennis, broadsword, quarter-staff, bastard (blunted) sword, singlestick. 'Casting the bar' or the sledge-hammer was a favourite sport of that all-round athlete, Henry VIII. The Londoners have always been famous for their love of athletic sports. The Cotswold Games—famous in the 16th and 17th centuries—were founded by Robert Dover, attorney of Barton Heath, Warwick; they were held at Dover's Hill, near Honeybourne, and are described in *Annalia Dubrensia* (1636) and the *Cotswold Muse*. Judge Hughes's *Scouring of the White Horse* describes a similar meeting in Berks. The carnival at Halgaver Moor, Bodmin, was visited by Charles II. The Westmorland and Cumberland sports are closely akin to the ancient Highland games. The honour of holding the oldest athletic sports in the modern sense—in 1812—is claimed doubtfully by the Royal Military College at Sandhurst. The following are important dates in the history of amateur sport:

1837. Rugby School Crick Run founded.
1840–50. Occasional sports at chief public schools.
1852. 6th and 8th Dec.—Exeter College, Oxford, held the first sports at either university.
1853. Oct. 22—Cheltenham College held first 'modern' sports, with programmes, &c.—a regular festival.
1855. Oct.—First work on modern athletics, by 'Stonehenge.'
1857. Feb.—Trinity College, Dublin, first sports.
" March 16, 17, and 18—Cambridge University Sports.
1860. Dec.—Oxford University Sports founded.
1861. Nov.—West London Rowing Club held first open amateur races.
1863. June—Mincing Lane Athletic Club formed.
1864. March 5—First Inter-'Varsity Sports at Oxford.
" April 21—First Civil Service Sports.
1866. Feb. 24—First sports held by London Athletic Club.
1866. Amateur Athletic Club formed.
" March 23—Amateur athletic championships first held.
1867. Inter-'Varsity Sports moved to London.
" Irish Civil Service Sports, Dublin, first held.
1869. March 18—Lillie Bridge Grounds, London, opened.
" Swimming Association of Great Britain founded.
1877. April 28—London Athletic Club ground opened.
1878. Bicycle Union founded.
1880. April 24—Amateur Athletic Association formed.
1883. June 14—Bicycle Union became National Cyclists' Union.
1884. Amateur Swimming Union formed.
1885. Amalgamated with Swimming Association of Great Britain, and became Amateur Swimming Association.
1887. Sept. 18—Riot at Lillie Bridge, thereafter closed.
1888. Queen's Grounds opened for Inter-'Varsity Sports.
1895. Sept. 4—London A.C. sent a team to meet New York A.C. America beat England in all eleven events.
1896. April 6–13—Olympic Games, the Stadium, Athens.
1906. Athenian Celebration, Olympic Games.

From 1896 Olympic Games were held in every fourth year (except 1916) in different places (Paris, St Louis, London, Stockholm, Antwerp, Paris, Amsterdam).

Chief Clubs and Grounds.—The London Athletic Club holds several meetings in the year at the

ground of the Chelsea Football Club, Stamford Bridge. It is the largest athletic club in the kingdom, with a first-rate cinder-track of four laps to the mile. The straight track of 200 yards, the only one of its kind in the country which was used exclusively by amateurs, was done away with when the ground was remodelled and taken possession of by the Chelsea Football Club. There is a very fine track at Herne Hill, leased by the London County Cycling and Athletic Club; but both the Catford and Putney tracks have been done away with. The former was built especially for speed-cycling, and was banked nearly 8 feet high at the bends, where it was 20 feet wide. The Wood Green track in north London has also been built over; but there is an excellent track at the Stadium, Shepherd's Bush, constructed for the Olympic Games of 1908, and another one at Queen's Club, West Kensington, where the Inter-'Varsity athletic sports are held in the early spring. There is no faster track in the country than the one at Stamford, for it is slightly banked at the bends and there are two long straights which are dead-level. In the provinces, the finest cinder-track is that of the Manchester Athletic Club at Fallowfield; the championships of the Amateur Athletic Association have been decided there.

Chief Athletic Meetings.—Amateur sports had at first a hard struggle for existence, as general sport had then sunk to a very low ebb. They began with the various college sports. At Christchurch, Oxford, 14th March 1861, when the Prince of Wales was present, Lord Beaumont won the hurdles, Sir Frederick Johnson the long jump, with Hart Dyke second. The part taken by the Duke of Hamilton and other noblemen attracted attention to the new departure; then the Inter-'Varsity meeting gave the new movement 'tone.' The first big athletic meeting was that in 1864 of the Civil Service Sports, still one of the best meetings of the year; but far and away the most important sports are the annual championships of the Amateur Athletic Association, held the first Saturday in July in London. Competitors are attracted from America, Australia, &c., as an English is practically the world's championship. Of closed meetings, the Inter-'Varsity are the chief. In London, besides those already mentioned, the chief are the L.A.C., United Hospitals, Blackheath, South London, Finchley, and Polytechnic Harriers. The Public Schools Sports Meeting is an important annual event. In 1919 the Inter-University Board of Great Britain was founded. The establishment of the Olympic Games has popularised international athletic matches such as the Landskamp in Scandinavia and contests between Great Britain and the United States. In Great Britain, where there have been no grants of public money for the purpose, the financing of international teams is a difficult problem.

Essex, Kent, and Hampshire take the lead in county championships, the best sports being annually held at Southend-on-Sea. Of late sports have advanced at a bound in the Channel Islands (September). In Ireland, Dublin University draws the largest and most fashionable 'gates.' The Queen's Colleges at Cork, Galway, and Belfast also promote important sports; and the North of Ireland Cricket Club Sports (established 1870) draw a noted gathering. Irishmen excel in shot-putting, hammer-throwing, and jumping. In Scotland there are, as in Ireland, annual championships.

Except cycling, no branch of sport has so rapidly expanded as cross-country running, formerly known as 'paper-chasing,' or hare and hounds. The Thames Hare and Hounds held the first open race, the 'cross country,' on 7th December 1867, at Wimbledon. The National C.C. Championship (1877) is held alternately in North, South, and Midlands. Each club enters twenty, and runs not more than twelve, men. The positions of the first six are added together, and the club with the lowest score wins. There are generally over 300 runners, and the distance is about 10 miles of pretty stiff 'hunting country.' In 1892 the Southern Junior was run partly over Epsom Racecourse, and there were over 300 runners. Cambridge and Oxford have now an annual meeting. Among the chief London 'harriers' are the Ranelagh, Highgate, Herne Hill, Finchley, Polytechnic, Blackheath, South London, Essex Beagles, &c. The London clubs usually meet on Saturdays for a run. They either (1) make the best of their way throughout, or (2) appoint a 'pace-maker' to regulate the speed of the hounds, so as to give the slower runners a chance, or (3), after the hares have had their 'law,' start the 'slow pack' first, and the fast pack afterwards. In the cross-country races for prizes the trail is carefully laid beforehand, and the runners are handicapped by time starts. Sometimes all the competitors are started together, each being allowed so many minutes and seconds, which are deducted from his time for the whole distance, and he whose time comes out the shortest is declared the winner. This is called a 'yacht race' if the starts are declared beforehand; if not made public till afterwards, it is a 'sealed handicap.' Rugby was the cradle of paper-chasing. Early in the century the fags carried the paper, while the præpostors, armed with horse-whips, were the huntsmen, and some even hired horses to follow the line. The famous Rugby 'Crick Run' (1837) is the oldest regular athletic event in the world.

In comparing modern records with those of about 1865, it must be remembered that amateur sport was then in its infancy; an athlete had few opportunities for showing his skill, whereas now he has a confusing choice. There were few tracks, and training was but little understood. Even allowing for this, there has been a tremendous improvement, and how closely the best amateurs now approach the professionals is shown by a comparison of the tables given in almanacs. While there is no short-distance runner of the calibre of either Hutchens, of the old school, or Donaldson, representing present-day pedestrianism, there is little doubt that middle and long distance men in the amateur ranks are superior to those recognised as professionals. There are now no inducements for men to train for money matches or stakes, though the promotion of a long-distance race for professionals in connection with the Powderhall festival in Edinburgh, and at the sports run in the summer under the management of the *Sporting Chronicle* (Manchester), have brought out fine long-distance runners. The walkers, however, now have little or no support, and a race for the professional short-distance championship in London in the spring of 1913 did not attract a hundred spectators, though Fenton (an ex-amateur champion) and Cummings, the contestants, were known to be capable of accomplishing a splendid performance.

There are separate articles on the following subjects connected with sports and pastimes:

Alpine climbing.	Coursing.	Fox-hunting.	Quoits.
Amateur.	Cricket.	Golf.	Rackets.
Angling.	Croquet.	Gymnastics.	Rowing.
Archery.	Curling.	Hockey.	Skating.
Base-ball.	Cycling.	Horse-racing.	Swimming.
Bowls.	Falconry.	Polo.	Tennis.
Bull-baiting.	Fencing.	Pugilism.	Wrestling.
Bull-fight.	Football.	Quintain.	Yacht.

Athlone, a town on both sides of the Shannon, in Westmeath, 80 miles W. of Dublin by rail. The Shannon is crossed by a fine bowstring and lattice iron bridge of two arches, 175 and 40

feet span. Till 1885 Athlone returned one member to parliament. Athlone Castle, founded in the reign of King John, was one of the chief military positions in Ireland. In the war of 1688 it was unsuccessfully besieged by William III. in person, but was afterwards taken by General Ginkell. There are woollen and saw-mills, and eel-fisheries. Pop. (1926) 7546.

Atholl, Athol, or Athole, a district in the north of Perthshire, occupying a great part of the southern slopes of the Grampians, and giving the title of Duke of Atholl to a branch of the Murray family. See Blair-Atholl.

A'thos (Gr. *Hagion Oros*, It. *Monte Santo*, 'Holy Mountain'), the most easterly of the three tongues of the Chalcidice Peninsula on the Ægean Sea, connected with the mainland by a low and narrow isthmus, about a mile across. The length of the peninsula is about 31 miles; its breadth varies from 3 to 6 miles. At the southern extremity, a solitary peak rises abruptly to a height of 6346 feet above the sea. In ancient times, several towns were built on the peninsula, five being mentioned by Herodotus. The Persian king Xerxes cut a canal through the isthmus, to escape the stormy gales which rendered the navigation round the promontory very perilous, and which had shattered the fleet of Mardonius some years before. Traces of this canal still exist. This peninsula is celebrated as the seat of a kind of monastic republic (subject to Greece since 1912), consisting of twenty large monasteries, twelve hermitages, numerous hermits' cells and small houses. The monks number about 8000, mostly Greeks and Russians. The whole community is governed by four presidents, one styled 'First Man of Athos,' and a Holy Synod, consisting of one representative from each monastery. Under the Turks they enjoyed complete autonomy, subject to paying an annual tribute of £3500. The monks follow the rule of St Basil, supplemented by the typikon of each house. They are employed in agriculture, gardening, bee-keeping, and the manufacture of amulets, religious objects, &c., while they also reap profits from the numerous visits of pilgrims. The brethren in the idiorrhythmoi (republican monasteries) have been compared to fellows of a college. They are interested in worldly affairs, own private property, and may eat meat if they cook it themselves. Karyes, the principal place in the peninsula, is picturesquely situated in the midst of vineyards and gardens. Here the market is held. No female, even of the lower animals, is permitted to enter the peninsula. In the middle ages, Athos was the centre of Greek learning and Christian-Byzantine art; now learning is at a low ebb, and the libraries have been sadly neglected. In the 20th century the 'heresy of the name of God' (that the name of God is itself God) gained many adherents in Athos, and over 800 heretical monks were deported by Russian soldiers to Odessa and the White Sea in 1913.

See books by Hasluck (1924), and R. Byron (1928).

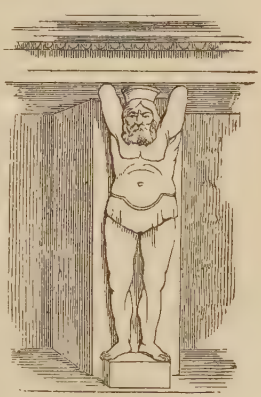
Athy', the chief town of County Kildare, Ireland, on the river Barrow, here joined by the Grand Canal, 45 miles SW. of Dublin by rail. It has a large grain-market. Pop. (1926) 3459.

Atitlán, a Central American lake, in the department of Solola, in Guatemala, 24 miles in length, and 8 to 10 miles in breadth. It seems to occupy the crater of an extinct volcano, and has a depth of over 1000 feet; and it has no visible outlet, though several small streams run into it. High cliffs, almost bare of vegetation, surround the lake, and on its southern bank rises the volcano of Atitlán (10,538 feet), at whose foot lies the little Indian town of Santiago de Atitlán.

Atlanta, called the 'Gate City,' is the capital of Georgia, the largest city in the state, and the seat of justice of Fulton county. An eminently prosperous place, it is situated 1100 feet above sea-level, on an elevated ridge dividing the waters of the Chattahoochee River from the rivers that flow into the Atlantic, 294 miles NW. of Savannah. It has a remarkably healthy and equable climate, the mean annual temperature being about 60° F. It is 7 miles SE. of the Chattahoochee River. Seven railroads centre at Atlanta, the most of which are trunk-lines with numerous connections. Atlanta has an extensive and rapidly increasing trade in cotton, dry goods, horses and mules, grain, and tobacco. Its industries include flour and cotton mills, the manufacture of machinery, agricultural implements, street cars, cotton-seed oil, and fertilisers.

The chief public buildings are the state capitol, court-house, custom-house, city hall, chamber of commerce, and opera-house. There are primary, grammar, and high schools for white and coloured persons. Other institutions are Emory and Oglethorpe universities, a technical college, a Congregational theological seminary, schools of medicine, and several important institutions for education of coloured students, including Atlanta university, and Morris Brown, Spelman and Clark universities. In the civil war, the city was captured by the Union troops under General Sherman (September 2, 1864), and the entire business portion was destroyed by them on leaving it about a month later. Since the restoration of peace, however, its prosperity has been uninterrupted and its growth rapid. Important town-planning schemes have been set on foot. Atlanta was settled in 1840; was incorporated as the village of Marthasville in 1842; as Atlanta, in 1847. Pop. (1850) 2572; (1860) 9554; (1870) 21,879; (1880) 37,409; (1900) 89,872; (1910) 154,839; (1920) 200,616, of whom 62,880 were negroes.

Atlantes, in Architecture, so called by the Greeks in reference to the mythical Atlas (q.v.), are male figures used instead of columns. The Romans called them Telamones. Female figures employed in this way are called Caryatides (q.v.).



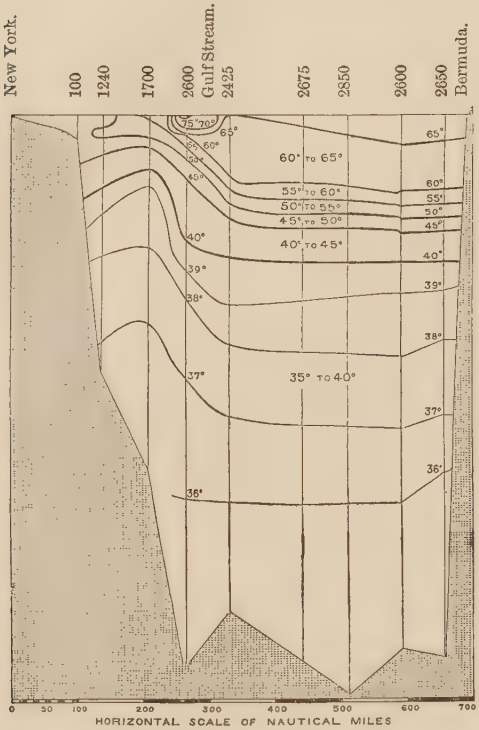
Atlas Column.

Atlantic City, a fashionable American health-resort, is situated on a narrow, sandy island off the coast of New Jersey, 60 miles SE. of Philadelphia by rail. A good beach attracts large numbers of summer visitors. Incorporated in 1854, the place grew rapidly; its wide avenues are lined with handsome cottages, villas, and hotels. Pop. (1870) 1043; (1890) 13,055; (1920) 50,707.

Atlantic Monthly. See Holmes, Lowell.

Atlantic Ocean, so called either from Mount Atlas or from the fabulous island of Atlantis, separating the Old from the New World, Europe and Africa being on the E., and North and South America on the W. Its greatest width is about 5000 miles, but between Brazil and the African coast the distance is only about 1600 miles. It is in open communication with both the Arctic Ocean and the Antarctic through the Southern Ocean. The North Atlantic, from the Norwegian Sea to the

equator, has an area of 14,300,000 sq. m. It communicates with many inclosed or partially inclosed seas, such as the Caribbean Sea, Gulf of Mexico,



Section of the North Atlantic Ocean, across the Gulf Stream, between New York and Bermuda:

Showing the Soundings (in fathoms) and Isothermal Lines obtained in H.M.S. *Challenger*. The vertical scale, as compared with the horizontal, is as 400 to 1; so that the inclines are 400 times less steep than represented. It was necessary to adopt this exaggerated scale in order to show the relative position of the Isothermal Lines.

and Hudson Bay on the west, the Baltic, North Sea, Mediterranean, and Black Sea on the east, whose combined areas are about 3,700,000 sq. m. The South Atlantic from the equator to 40° S. has an area of over 10,300,000 sq. m.; if it be supposed to extend through the Great Southern Ocean as far as the Antarctic circle, its area is nearly 17,000,000 sq. m. Including the Arctic Ocean and the other seas with which it is in open communication, the Atlantic has a drainage area of over 26,500,000 sq. m. On this land, draining directly or indirectly into the Atlantic, Sir John Murray estimates there is a rainfall of 15,800 cubic miles annually, and that the annual discharge of rivers into the Atlantic is 3400 cubic miles of water, equal to about one-half the rainfall and river discharge of the world.

Towards the centre of the North Atlantic, between Africa and North America, and in the centre of the South Atlantic, between Africa and South America, there are anticyclonic areas of high atmospheric pressure (over 30 inches), out of which winds blow in all directions to surrounding regions where the pressure is less. For instance, to the westward of North Africa, the prevailing winds are northerly and north-westerly; on the south side of the anticyclonic region they are easterly; and on the west, off the North American coast, they are southerly. A similar system of winds prevails in the South Atlantic. The positions of these high-pressure areas, and the winds that blow out from them, determine the great oceanic currents and the positions of the Sargasso seas, for the winds everywhere determine and control the movements of the surface waters. The SE. and NE. trades drive the heated surface waters of the tropics before them, and eventually produce the *Equatorial currents*. On reaching Cape St Roque the southern current bifurcates, one branch becoming the *Brazil current* of the South Atlantic, the larger branch passing on to the Caribbean Sea and Gulf of Mexico, finally issuing from the latter by the Strait of Florida, forming the *Gulf Stream*, the greatest and most important of all oceanic currents. The Gulf Stream spreads out over the Atlantic to the south of Newfoundland; one prolongation of it returns to the tropics off the coasts of Spain and Africa; the other passes north between the British Isles and Iceland, and on to the coasts of Norway. A cold Arctic current passes southward along the shores of Greenland, and unites off Cape Farewell with the Davis Strait current, forming the *Labrador current*, which proceeds along the east coast of America, and passes beneath the Gulf Stream to the south of the banks of Newfoundland. Icebergs are carried as far south as 40° N. in the northern and as far north as 38° S. in the southern hemisphere. In the equatorial regions the surface water has generally a temperature ranging from 70° to 84° F.; the temperature decreases as the depth increases, the coldest water being found at the bottom, though a slightly higher temperature is said to have been recorded just above the bottom. The warm water is a relatively thin stratum, the greater part of ocean water having a temperature below 40° F. It is ice-cold in the Atlantic at the bottom even beneath the equator; the ooze dredged from the bottom beneath a tropical sun is so cold that the hand cannot be placed in it without great discomfort. The low temperature of deep ocean water is acquired in the polar regions chiefly in the high latitudes of the southern hemisphere.

The warm salt water carried into the North Atlantic by the Gulf Stream slowly sinks on account of the reduction of temperature on reaching higher latitudes, and carries heat down with it, consequently relatively warm water is found at a greater depth in the North Atlantic than in any other ocean. A temperature of 45° is found off the north of Scotland at a depth of 600 fathoms (three-fourths of a mile), while off the west coast of Africa a similar temperature is met with at only 200 fathoms beneath the surface. The temperature of the ocean is lower off the leeward shores of continents than on the weather shores, as the cold deep water is drawn up to the surface to supply the place of that driven before the winds: this is probably the reason why coral reefs are absent in the eastern parts of the ocean in the tropics, while they flourish in the western. The water of the Atlantic is freshest—that is, contains the least salt—towards the poles and in the equatorial belt of calms. The saltest water (density over 1·0275) is found in the centre of the trade-wind regions. This is not, however, so salt as the Mediterranean and Red Sea (over 1·0280). The salinity of the deeper waters is considerably below the average of the surface. The average depth of the Atlantic is between 2 and 3 miles (2200 fathoms). A low submarine ridge runs down the centre, from north to south, with an average depth of about 1700 fathoms over it. On either side of this ridge there are, both in the North and South Atlantic, depths of between 3000 and 4000 fathoms. The greatest depth is in the Nares Deep north of the Virgin Islands, where a sounding of 4662 fathoms has been obtained. The deposits towards the central portions of the Atlantic are chiefly made up of the dead calcareous shells of

organisms which have fallen from the surface. On the central elevation, where the depths are less than 1500 fathoms, the deposits are largely made up of the shells of pelagic Molluscs, and the deposits are called *Pteropod ooze;* from 1500 to 3000 fathoms, the shells of pelagic Foraminifera prevail, and the deposits are named *Globigerina ooze.* In depths greater than 3000 fathoms there is a reddish clay, chiefly made up of disintegrated pumice and other volcanic material. Near the shores there is a mixture of land débris and surface organisms, and the deposits are red and blue muds, green glauconitic muds and sands, coral and volcanic muds and sands. The surface waters from equator to poles swarm with all kinds of pelagic plants and animals, many of which emit phosphorescent light, producing what is known as luminosity of the sea. In the centre of the North Atlantic, in the so-called Sargasso Sea, there are enormous floating banks of gulf weed (*Sargassum bacciferum*), on which large numbers of peculiar animals live. Life has been found to exist at all depths in the Atlantic, but it becomes less abundant as greater depths and a greater distance from continental shores are reached. There are relatively few oceanic islands. Iceland, the Azores, St Paul's Rocks, Ascension, and the Tristan da Cunha group all rise from the central elevation, and are all of volcanic origin. Jan Mayen rises from the deep water of the Norwegian Sea. The coral group of Bermudas rises from the deep water of the Western North Atlantic. Off the west coast of Africa are the Canaries, Cape Verdes, and Madeira. In the South Atlantic, to the west of the central ridge, are Fernando Noronha and Trinidad, and to the east of the central ridge, St Helena. There are numerous continental islands, such as the British Isles, Newfoundland, the West Indies, the Falklands, and others. The most civilised nations of the world inhabit the shores of the Atlantic, and it is the great commercial highway of the world. Its coasts are better surveyed, better lighted, and its winds and currents better known than those of any other ocean. It has been sounded in all directions. In the neighbourhood of some continental shores, and around some of the volcanic cones which rise from the floor of the ocean, there are occasionally very steep slopes; but as a rule the bed of the ocean is a widespread, gently undulating plain.

Atlantis, a vast mythical island in the Atlantic mentioned by Plato, of which an Egyptian priest had told Solon. An earthquake is said to have engulfed it nine thousand years before his time, at the close of a long contest with the Athenians. Plato says that shoals of sand marked the site. The Gardens of the Hesperides and the Islands of the Blessed were referred to the same region. The Celts had wonderful tales of a land of the dead in the west, Glasinnis or Avalon (q.v.), whence perhaps the phrase 'to go west.' Stories about an Antilia (see ANTILLES), Brasilia, and the St Brendan (q.v.) legend reflect similar beliefs. Palæontological evidence shows that land actually existed in the west in Tertiary times; but of this there could be no tradition. It has been suggested that the Atlantis of the Egyptians was Crete (which was west for them), and that the Greeks transferred it farther west. Others favour Morocco.

Atlantosaurus, one of the largest dinosaurs of which remains have been preserved, also called Titanosaurus. The femur is 6 feet 2 inches long. The size of the bone indicates a length for the animal of at least 60 feet, and a height of 30 feet or thereabout. The remains were obtained in the Jurassic strata of Colorado. See DINOSAURIA, DIPLODOCUS.

Atlas, in Greek Mythology, son of the Titan Iapetus and Clymene, and brother of Prometheus and Epimetheus. He was father of the Pleiades and the Hyades. As leader of the Titans, he attempted to storm the heavens, and for this supreme treason was condemned by Zeus to bear the vault of heaven on his head and hands, in the neighbourhood of the Hesperides at the western extremity of the earth, where day and night meet, on the mountains in the north-west of Africa still called by his name. Some supposed, however, that he was originally a man metamorphosed into a mountain; and Ovid explains that Perseus changed him by means of Medusa's head into stone for his inhospitality. Some tried to rationalise the myth, explaining Atlas as a mighty king who had great skill in astronomy, and only tried to storm heaven intellectually.

Mercator, in the 16th century, gave the name *Atlas* to a collection of maps, probably because the figure of Atlas had been on the title-pages. See MAP.

Atlas, the great mountain-system of North-western Africa, stretching from Cape Nun in Morocco to Cape Bon in Tunis, a distance of about 1400 miles. It is not a chain, but a very irregular mass of many chains running in various directions, meeting in mountain-knots, or connected by short chains of inferior height, and diversified still further by several solitary mountains and groups of mountains. The general direction is from south-west to north-east. Some limit the Atlas proper to Morocco. At any rate the principal chain, *Jebel Aiaschin,* is entirely within Morocco, forming a three-sided watershed to the Mediterranean, the Atlantic, and the Sahara. The Atlas attains its greatest height (estimated at 14,500 feet) in Ouen Krim—about 60 miles SSW. of the city of Morocco—Jebel Ifni, and Tizi n' Tagharat. The most southern chain diverging from the central mass bears the name *Jebel-Hadnar.* The heights approach the sea, and form the promontories jutting out into the Atlantic. From Morocco, the Atlas gradually decreases in height towards the east. In Algeria the elevation is only 7673 feet; in Tunis, 4476 feet; and in Tripoli, 3200. The slopes on the north, west, and south are covered with vast forests of holly-oak, cork, *Callitris quadrivalvis, Cedrus atlantica, Abies numidica,* and wild olive. Except on the southern slopes, there are many well-watered, fertile valleys, carefully tilled and irrigated. On some summits snow lies for a great part of the year. Iron and copper ores have proved a bait to European ambitions; salt and fine marbles abound; lead and antimony are also found.

Atlas is that piece of the human vertebral column which articulates with the Skull (q.v.); in other words, the first cervical vertebra. It may be distinguished from the other six by its being without a body and spinous process, by its being a mere irregular bony ring, divided into two unequal parts by a constriction; this division in the recent subject is completed by a ligament, the segment in front being occupied by the tooth-like process of the second cervical vertebra or axis, and that behind by the spinal cord and its coverings. On either side the ring is very thick; each lateral mass is smooth and cupped above to receive the condyles of the occipital bone. The corresponding parts below are flat, and rest on the second cervical vertebra. The atlas, with the occipital bone, forms the joint on which the head moves in nodding; and turns on the pivot of the second cervical vertebra, when we look from side to side. See SPINAL COLUMN.

Atlas, a kind of silk-satin manufactured in the East. The word is Arabic, and means 'smooth,' 'bare;' hence it has been applied to smooth silk cloth.

Atmol'ysis, a method of separating a mixture of gases by taking advantage of their different rates of passage through a porous septum. See DIFFUSION, GASES.

Atmometer, an instrument which can be used to determine the humidity of the atmosphere. Its action has not yet been fully investigated. It consists of a hollow ball of unglazed clay with a glass stem. The whole is filled with water and inverted in a dish of mercury. As the water, having passed into the pores, evaporates from the surface of the ball, the mercury rises in the stem. If much water-vapour be present in the atmosphere, condensation takes place in the pores, and the mercury falls in the tube.

Atmosphere (Gr. *atmos*, 'vapour,' *sphaira*, 'sphere') is the name applied to the gaseous envelope which surrounds the earth. The existence of an atmosphere is to us a matter of vital importance. We owe to its influence the possibility of animal and vegetable life, the modifying and retaining of solar heat, the transmission of sound, the gradual shading of day into night, the disintegration of rocks, and the occurrence of weather phenomena. In consequence of the action of gravity, the atmosphere assumes the form of a spheroidal stratum concentric with the earth, and presses heavily on its surface. It exhibits, in common with all fluid bodies, the usual characteristics of hydrostatic pressure, but its internal condition differs from that of a liquid inasmuch as its particles repel each other, and can only be held in proximity by external force. From this circumstance it follows that the volume of any portion of air varies much more under the influence of external pressure than that of an equal volume of water; hence, the stratum of air nearest the earth is denser than strata in the upper regions, where, from their being subjected to the weight of a smaller mass of superincumbent air, the repulsive force of the particles has freer play.

That air possesses *weight*, is illustrated by the following simple experiment. If a hollow glass globe of 3 or 6 inches in diameter be weighed first when filled with air, and then after the air has been extracted from it by means of the air-pump, it will, when thus exhausted, weigh sensibly less than it did before, and the difference of the two results will represent the weight of the quantity of air which has been withdrawn. It has been determined by Biot and Arago that 100 cubic inches of dry air, when the barometer is at 30 inches, and the thermometer at 60° F., weigh 31·074 grains. The law of Archimedes (see ARCHIMEDES, PRINCIPLE OF), that a body immersed in a fluid loses a part of its weight equal to the weight of the volume of fluid displaced by it, finds its application in air as well as in water. If a glass globe filled with air and closed be suspended at the extremity of the beam of a delicate balance, and be kept in equilibrium by a brass weight at the other extremity, and if the whole be then placed under the receiver of an air-pump, and the air extracted, the equilibrium previously existing in air will be disturbed, and the larger body will become the heavier. The reason of this is, that when first weighed, they each lose as much of their own weight as that of the respective volumes of air displaced by them, and are therefore made buoyant, though in different degrees, the ball with the larger volume having the greater buoyancy. In a vacuum, they are deprived of this buoyancy, and the larger body, suffering the greater loss, becomes sensibly heavier than the other. In like manner, a balloon filled with heated air or hydrogen gas is lighter than the volume of air displaced by it. It is therefore forced upwards till it reaches a stratum of such density that the weight of the volume of air there displaced by it equals the weight of the balloon itself. In this stratum it will remain poised, or move horizontally with the currents to which it may be exposed.

In endeavouring to determine the *form* of the atmospheric envelope, it is necessary to bear in mind that, according to the law of fluid-pressure, in order to produce a state of equilibrium at the level of the sea, the pressure of the atmosphere must be equal at that level over the whole of the earth's surface. Gravity acts with less force on the air at the equator than on that at the poles, in consequence of the spheroidal form of the earth. It has there, in addition, to contend with the centrifugal force, which entirely fails at the poles, and which has a tendency to lighten the air by acting contrary to that of gravity. Hence we infer that, in order to produce the same pressure at the level of the sea, the atmospheric height at the equator must be greater than that at the poles, and that the atmosphere must therefore possess the form of an oblate spheroid, whose oblateness is considerably greater than that of the earth itself. The greater heat at the tropical regions must also have the effect of increasing the oblateness.

The *height* of the atmosphere has not yet been determined. That it must have a certain limit, is evident from the consideration that there must be a point at which gravity on the one hand, and centrifugal force and the repulsive action of the particles on the other, are poised; and beyond this point, the latter forces outbalancing the former force, the aërial particles would be borne away from the earth. As, however, the law of the diminution of temperature, which materially affects the repulsive action, is unknown for the upper regions of the air, it is impossible to calculate the height of the atmosphere from the relations of these forces. From the observation of luminous meteors, however, it is inferred that in an extremely attenuated form it even reaches 500 miles.

The *pressure* of the atmosphere is one of its most important properties. Its effect is exhibited in the action of the ordinary water-pump. The piston is fitted air-tight in its cylinder; and on being drawn up, creates a vacuum. The water within the pump being thus freed from pressure, while that outside of it is exposed to the pressure of a column of air reaching to the surface of the atmosphere, is at once forced up by reason of the weight of air which it must rise to balance. The ascent of the water takes place till the piston has reached the height of nearly 34 feet, from which we conclude that a column of air is equal in weight to a column of water of the same horizontal section, and of the height of nearly 34 feet. As mercury is 13·6 times heavier than water, a mercurial column freed from atmospheric pressure at the one extremity, and subjected to it at the other, is 13·6 times less in height than the column of water, or about 30 inches. From the more convenient size of this column, mercury has been adopted as the standard for atmospheric pressure, and is employed in our ordinary Barometers (q.v.). A mercurial column of 30 inches in height, and 1 square inch in section, weighs 15 lb. (more accurately, 14·73), which gives us the equivalent weight of a column of atmospheric air of the same section. The word *atmosphere* is often employed to express this weight or pressure on a square inch of surface, so that when we speak, in Mechanics, of the pressure of steam on a boiler as amounting to three atmospheres, we mean a pressure of 45 lb. on the square inch. The pressure on a square inch being thus ascertained, we have merely to multiply it by the number of square inches on the earth's surface to obtain the total pressure or weight of the atmo-

sphere. It amounts to 11·67085 trillions of lbs., or about $\frac{1}{1320000}$ of the earth's mass. It must be observed that the height of the barometric column is not a constant quantity, as it varies irregularly from time to time, and more or less regularly with the latitude, the region, the season of the year, and the hour of the day. The pressure of the atmosphere in the northern hemisphere increases as we recede from the equator, reaching a maximum at 30° N. lat., and generally decreasing from 30° to 65°, where it again begins to rise. The greater height, about 30°, is restricted to the oceans immediately to the westward of continents. As the heat of the earth's surface increases the rarity of the air above it, and causes the air at the top of the heated column to overflow, the barometer stands at a minimum in summer and a maximum in winter, and this obtains over the continents or land surfaces of the globe. But over the oceans of the higher latitudes pressure falls to the annual minimum in winter, and rises to the maximum in the early summer. The variations of atmospheric temperature which occur, with their effects, result in a regular diurnal variation of the pressure of the atmosphere. There are two maxima—one about 10 A.M., the other 10 P.M.; and two minima—at 4 A.M and 4 P.M.

The *temperature* of the atmosphere as shown from automatic instruments attached to unmanned balloons falls in general to a height of 6 miles, at the rate of about 1° F. for each rise of 300 feet. Above this level the temperature remains practically constant, no further decrease taking place. The name *stratosphere* has been given to this upper region, the lower surface of which in the British Isles varies roughly between 5 and 7 miles. The height at which the stratosphere is entered is highest over the equator and lowest in polar regions. Temperature does not continue to fall in the stratosphere, because of equality in that region between emitted and absorbed radiation. In an ascent from Batavia on 5th November 1913 a temperature of −133° F., or 165° below freezing-point, was registered at a height of 10·6 miles, being the lowest air temperature recorded.

Till 1894 it was assumed that the chemical composition of the atmosphere had been definitely ascertained, and that 100 volumes of dry air might be taken, on the average, as consisting of 79·02 volumes of nitrogen, 20·94 of oxygen, and 0·04 of carbonic acid; with other gaseous matters, but in quantities so small as not sensibly to increase the bulk of the atmosphere, such as ammonia and ammoniacal salts, carburetted and sulphuretted hydrogen, carbonic oxide, sulphurous and sulphuric acid, nitric acid, and perhaps iodine, the quantity and even the presence of which are affected by local and meteorological causes. But the discovery of argon in 1894, announced in 1895, and the associated discovery of helium (both described at ARGON), startled the world and prepared the way for the intimation that three other gases, to be called neon, krypton, and xenon, were also to be detected in our atmosphere. Still, dry air may be said to consist of 4 volumes of nitrogen and 1 of oxygen, with an admixture of argon and carbonic acid, and a mere trace of several other substances. As, however, the air of the atmosphere is never found dry, we must add to the constituents already named watery vapour, the amount of which is constantly changing, according to locality, weather, wind, and temperature. It is stated that of 1000 grains of atmospheric air, the proportion due to aqueous vapour varies from a minimum of 4 to a maximum of 16 grains. By far the most active chemical constituent of the atmosphere is oxygen, to the agency of which are owing the existence of animal life, the maintenance of combustion, the rusting of metals, and the occurrence of several other chemical phenomena too numerous to be detailed. A small portion of this oxygen occurs in the form of Ozone (q.v.), a modification which, according to recent chemical discoveries, plays an important part in the chemistry of the atmosphere. The nitrogen which forms the bulk of the atmosphere possesses few chemical properties of importance, but performs the important part of diluting the oxygen, which, if it occurred alone, would act with too great intensity. The presence of carbonic acid in the air is shown by the production of the white carbonate of lime in lime-water freely exposed to its influence. Carbonic acid is produced in all processes where carbonaceous matter unites itself with the oxygen of the air, such as in animal respiration, in combustion, in fermentation, in putrefaction, and similar processes. The green leaves of plants, on the other hand, possess, in presence of sunshine, the power of decomposing carbonic acid into its elements, absorbing the carbon for their own tissues, and restoring the oxygen to the atmosphere in its original purity. Between the processes above mentioned, on the one hand, and the action of plants on the other, the quantity of carbonic acid in the air is kept nearly constant. From the table it will be seen that 10,000 volumes of atmospheric air contain 4 volumes of carbonic acid. If it occurred in a much larger proportion, being poisonous, it would become dangerous to animal life; and if it occurred in a much less proportion, the vegetable world would lack its requisite nourishment. The other substances, of which a trace is always or only sometimes found in atmospheric air, are difficult to detect in the air itself, but are generally found dissolved in rain-water, more especially in that which has fallen immediately after a long drought. Of these, by far the most important and widely diffused are ammonia and ammoniacal salts, which are of essential importance to the vegetable economy, because, dissolved in the rain, they furnish plants with the nitrogen required by them for the production of their flowers and fruit. Nitric acid is detected in the air after thunderstorms, sulphuretted hydrogen in the tainted air of sewers and such-like places, and sulphurous and sulphuric acid only in the neighbourhood of chemical or smelting works. A considerable quantity of carbonic oxide and carburetted hydrogen escapes unconsumed from our furnaces; and although the latter gas is in addition given off to the air in marshy and bituminous districts, the two occur in almost inappreciable quantity in the atmosphere.

In addition to its gaseous constituents, the atmosphere contains solid substances in a state of exceedingly fine division, the presence of which is revealed in the sunbeam. Many of these minute particles, being the seeds or germs of plants and animals, must exert an important influence on the organic substances on which they may finally settle, inducing in many of them the conditions of disease or putrefaction. The results of the Krakatao eruption of August 1883, and deep-sea dredgings in the Pacific, reveal that a large amount of meteoric and volcanic dust is suspended in the atmosphere; and Aitken showed fine dust particles to be essential as nuclei in the formation of fog and cloud. In 1892–93 Dewar succeeded in liquefying atmospheric air. See DUST, ETHER, FOG, GAS AND GASES, GERM, HYDROSTATICS, LIGHT, REFRACTION, SOUND, WAVE.

When the composite nature of the atmosphere was first discovered, it was supposed to be a chemical combination of nitrogen and oxygen, but further inquiries have rendered this opinion highly improbable. When any two bodies unite with each other chemically, the substance which results from

their combination invariably possesses properties which the original constituents did not possess. Now the atmospheric union of oxygen and nitrogen is distinguished by no properties which may not be attributed individually to these gases. We have, then, in this respect, no indication that the atmospheric combination of oxygen and nitrogen is a chemical one. Again, when any composite gas is dissolved in water, the proportion of the ingredients dissolved in it is exactly the same as that in which they occur in the compound itself; but this is not the case with air dissolved in water, which is found to be richer in oxygen than atmospheric air. Now, as oxygen dissolves more readily in water than nitrogen, it is manifest that this larger proportion of oxygen arises from both gases acting independently of each other in respect to the water, a condition that would be impossible if they were in chemical union. From these and other corroborative facts, the atmosphere is considered to be simply a mechanical combination of the gases contained in it. This, however, does not prevent the atmosphere from having a uniform composition, as might at first sight be supposed; for when gases are mixed with each other, they may practically be regarded as intermingling thoroughly throughout the whole space occupied by them. Local causes may temporarily affect the relative proportion of the ingredients, but the changes are minute.

See C. J. P. Cave, *The Structure of the Atmosphere in Clear Weather* (1912); V. P. Lewes, *Air and Water* (1892); Wanklyn and Cooper, *Air Analysis* (1890); T. O'C. Sloane, *Liquid Air* (1899); Sir W. Ramsay, *The Gases of the Air: the History of their Discovery* (1896); W. H. Dines, *The Characteristics of the Free Atmosphere* (1919). See also ELECTRICITY (ATMOSPHERIC), METEOROLOGY, STORMS; for atmospheric engine, see AIR-ENGINE.

Atna, or COPPER RIVER, a river in South Alaska which rises between 62° and 63° N., and flows west of the Wrangell Mountains into the Gulf of Alaska, between Prince William Sound and Controller Bay. Glaciers and rapids mark its course. As its name indicates, copper is found in the valley. In 1911 the Copper River and Northwestern Railway was completed from the port of Cordova to Kennecott, about 200 miles inland.

Atoc, or ATOK, a Central and S. American skunk.

Atoka, a small town in the Choctaw portion of Oklahoma.

Atokos, a small Greek island in the Ionian group, north-east of Ithaca.

Atoll, a form of coral island, consisting of a more or less interrupted ring of coral rock, enclosing a central lagoon. The word *atollon* is used by the natives to denote the Maldive Islands, typical specimens of this formation (according to conjecture from Malayalam *adal*, 'closing'). As examples may be mentioned Whitsunday Island, Keeling Atoll, Bow Atoll, Peros Banhos Atoll. See CORAL, POLYNESIA.

Atolla, a widely distributed genus of deep-sea jelly-fishes. The marginal lobes are numerous, their number being indefinite. The number of tentacles is also irregular. The diameter of the umbella may reach 150 millimetres.

Atom. Matter is composed of atoms in the same sense as a house is built of bricks. The superficial appearance of continuity presented by any material substance, say water or iron, is deceptive. Ultimate continuity is probable, by reason of ether—the ether of space—but ordinary gravitative matter is atomic and discontinuous, as further explained under head MOLECULE. In modern use the term 'atom' is employed to designate the smallest portion of any element which can enter into chemical combination or otherwise take part in physical and chemical processes and yet preserve its identity. The atom of matter is not now supposed to be unchangeable or indivisible, because some of them—atoms of uranium, for instance—are known spontaneously to throw off fragments of themselves from time to time, thereby losing weight and passing into some other form of matter—one of which forms is on good evidence believed to be radium, while at a further stage in the process of subdivision or disintegration the residue is suspected of being the common metal lead. If the term degradation is applied to this process of spontaneous explosion and gradual disintegration, the term is to be understood in its strict sense as a passing down the scale of atomic weights, not in any sense of disparagement.

The small fragments of the original atom thrown off in the process of degradation are in many cases, perhaps in all, atoms of helium—a gas at first known only spectroscopically in the sun, and appropriately named by Sir Norman Lockyer, but subsequently discovered and isolated on the earth by Sir W. Ramsay as one of the great Argon group of inert monatomic chemical elements. Thus a heavy atom, though an atom of what has long been and may still be called an Element (q.v.), may be regarded as compounded or built up of a great number of constituents which can be thrown off with considerable energy, and thereafter lead an independent existence as sub-atoms or atoms of elements lower in the scale.

If, then, we consider the term 'atom' from the point of view of derivation, as meaning indivisible, we must admit that there is now some ambiguity about it, which, however, need not in practice be inconvenient. Each atom of uranium is not indivisible in the sense that it is an absolute smallest unit of matter, but it is the smallest unit of uranium; for when it degrades or subdivides, it ceases to be uranium and becomes something else. Thus the term atom may still, legitimately and historically, be used freely; although in the old sense, significant of ultimate indivisibility, it has now left the domain of matter and has applied itself to electricity, of which the Electron (q.v.) appears at present to be a really indivisible unit in the old sense. There are those who imagine that each atom of matter is composed of a specific grouping of such electrons or electrical units; but that hypothesis is as yet not proven.

Other hypotheses there have been—e.g. that the ultimate atom may be a vortex ring or other mode of rotational motion in the all-pervading and continuous substance known as Ether. This vortex hypothesis—identified with the name of its promulgator, Lord Kelvin—is not now supposed to apply to atoms of matter, but it may still possibly apply, in some form or other not yet elaborated, to the electrons or atoms of electricity.

One of the best-known and most reasonable modern speculations concerning the structure of an atom is one by Sir J. J. Thomson, that an atom of matter consists of a spherical mass of positive electricity with a number of electrons or units of negative electricity 'sown' in it and revolving in orbits, somewhat after the fashion of the constituent parts of a Volvox Globator (q.v.), though with a rapidity surpassingly great and subject to astronomical laws of great precision and beauty. His investigations strongly suggest that the number of electrons—or at least the number of accessible and tractable electrons—in an atom is a simple small multiple of its atomic weight.

Notwithstanding our ignorance of the structure of the atom of matter, we are fully informed as to the order of magnitude corresponding to its size—i.e. to the amount of space it effectively occupies. This is exceedingly small, far smaller than the most minute microscopic object, and accordingly

in every visible speck of matter the atoms are excessively numerous. A grain of lycopodium dust, for instance, contains many thousand million million atoms. And even the rarest substance, if reckoned by number of atoms, must be regarded as present everywhere, in almost every material, as a minute trace or impurity. The smallest drop of sea-water, for instance, contains many million atoms of gold, although a ton of sea-water contains only about the fiftieth of a grain of that substance. A summary of the arguments whereby the size of atoms is known will be found under MOLECULE.

But although atoms are so small and light (even the so-called heaviest of them) that a thousand million of them compressed together into a particle would be invisible in a microscope and would weigh far less than the thousand-millionth of a grain, yet each atom is the seat of a surprising amount of energy; and when this intra-atomic energy becomes effective, as it does occasionally in those substances which possess the property of radio-activity, a sub-atom of helium is flung off with such astounding velocity, nearly comparable with the velocity of light, that when it strikes a phosphorescent target—composed, say, of crystals of sulphide of zinc—the impact of each projectile produces a visible flash of light. In the aggregate these little flashes produce a glow visible in the dark; but very gentle magnifying power will suffice to analyse the glow into a great number of separate flashes or scintillations. A small pocket instrument, devised by Crookes, and called a Spinthariscope (q.v.), is sold to illustrate this. Every flash represents the impact of a single atom.

Although atomic explosions are astonishingly vigorous, so that we have discovered here a new source of energy, it is important to realise that its manifestations are purely spontaneous, and that there is at present no known way of stimulating them into activity; consequently this is not one of the forms of energy which at the present time are available for industrial use. An atom is occasionally the seat of an eruption, as a volcano is, but it is not subject to control.

The structure of atoms is to some extent exhibited by the nature of the light which they emit, the operation of examining the light being called Spectrum Analysis (see SPECTRUM). By subjecting the source of light to a powerful magnetic field, Zeeman showed that lines in the spectrum which had been single became multiple in many curious ways, and Lorentz has mathematically interpreted this effect as due to systematic and definite perturbation of regular orbits of electrons revolving in or round the atoms. These revolving electric charges constitute molecular electric currents, and are amenable to magnetic influence in a definite and known way, being perturbed, as a satellite is perturbed by a third attracting body, in gravitational astronomy. This fact enables a strong magnetic field applied to a source of light to furnish an intricate and instructive mode of examination when the light is analysed in a powerful spectroscope.

Although scepticism as to the existence of atoms is sometimes professed, it is impossible to deny that each form of Matter (q.v.) consists of units which if subdivided would lose the properties of that particular form of matter; and that is all that is intended by the modern use of the term. Even the electron, or atom of electricity, may in the course of discovery be subdivided, or, more likely, may be resolved into simple undifferentiated ether—though we have not the slightest inkling of any such possibility at present; and if such a process ever happens the electron's career would be terminated—that is to say, it would thereby cease to be electricity. But it is not to be supposed that any amount of subdivision or solution or differentiation can ever cause anything real to go out of existence or cease to be, though it may become intangible and imperceptible even to our instrumentally aided senses.

Books that amplify the statements here made are the following: *Electricity and Matter* and *The Corpuscular Theory of Matter*, by Sir J. J. Thomson; *Modern Views of Matter* (a Romanes Lecture, Oxford) and *Appendix to Modern Views of Electricity*, both by Sir Oliver Lodge; and *Radio-activity*, by Professor Rutherford, Cambridge University Press.

Atomic Number. See ATOMIC THEORY and PHYSICAL CHEMISTRY.

Atomic Theory. The atomic theory furnishes a convenient working hypothesis regarding the minute particles of which matter is composed. It is supported by important experimental evidence, both chemical and physical, and has been of great service in the explanation of chemical facts, as well as in the progress of scientific chemistry.

Theoretical speculations as to the constitution of matter date from the earliest times of philosophy, but the gradual development of the atomic theory into the form which it had assumed towards the end of the 19th century was the result of the accumulation of chemical and physical facts chiefly during the preceding period of about one hundred years.

The honour of having first formulated an atomic theory based upon experimental evidence, obtained from his own investigations and from those of his predecessors and contemporaries, falls to Dalton. Prior to Dalton's first publication, early in the 19th century, of his contributions to the subject, a good deal of investigation had been carried on which may be regarded as preparing the way for the establishment of a rational atomic theory, although it had not been fully recognised as such at the time. Thus it was known that in the formation of chemical compounds the constituent elements combined according to certain definite and fixed proportions. Moreover, by determining the quantities of various acids required to neutralise a given quantity of a particular base, and of various bases required to neutralise a given quantity of a particular acid, it had been ascertained that numbers could be assigned to each acid and base which represented quantities that were chemically equivalent. It was likewise known that the quantities of various metals dissolved by the same weight of an acid were capable of uniting with the same weights of oxygen. Further, it was known that several metals and other elements formed more than one compound with oxygen, the proportion of the latter being different in each. Dalton pointed out that when elements united with each other in two or more different proportions, these proportions were related to each other in a very simple way. Thus, he showed that a given weight of carbon united with a certain proportion of oxygen to form carbonic oxide (carbon monoxide), and with just twice as much to form carbonic anhydride (carbon dioxide or 'carbonic acid gas'); also that in olefiant gas (ethylene) and in marsh-gas (methane) the quantities of hydrogen combined with any given weight of carbon stand to each other as 1 to 2. Other examples were also known to him, notably in the case of the various compounds of oxygen and nitrogen, which showed simple relations of a similar kind. This regularity observed by Dalton has since come to be known as the *law of multiple proportions*, and, in accounting for the regularity, Dalton advanced the atomic hypothesis, which assumed that the different kinds of elementary matter consist of atoms (see ATOM) of different weights, that those of the same element were all

of the same weight, and that the smallest particles of compound substances, which he likewise designated atoms, but which are now known as molecules (see MOLECULE), consisted of two or more dissimilar atoms grouped in juxtaposition.

Dalton regarded carbonic oxide as a compound of 1 atom of carbon and 1 of oxygen, and carbonic anhydride as a compound of 1 atom of carbon and 2 of oxygen; olefiant gas as a compound of 1 atom of carbon and 1 of hydrogen, and marsh-gas as a compound of 1 atom of carbon and 2 of hydrogen. He assigned atomic weights or relative weights of the atoms, based upon the results of his own experiments, to each of the elements he had examined, assuming the atomic weight of hydrogen to be unity, since hydrogen combined with other elements in smaller proportion by weight than any other element. Although Dalton's atomic weights were far from accurate, yet his view was sound that the observed law of multiple proportions could be satisfactorily explained by the atomic hypothesis.

Dalton introduced a system of chemical notation, in which the atoms were represented by symbols, a system which was simplified later by Berzelius, whose modifications led to the symbolic chemical notation now employed.

Investigation within the present century indicates that Dalton's assumption that every atom of any given element possessed the same weight was incorrect, but that the apparent atomic weight is in numerous instances the average atomic weight of mixtures of atoms of somewhat varying atomic weights (isotopes; see PHYSICAL CHEMISTRY).

Quickly following on Dalton's discoveries was the discovery by Gay-Lussac of the simple relations of the volumes of gases which combine to form new compounds, and of the volume, in the form of gas or vapour, of the new substance produced. Thus Gay-Lussac proved that 2 volumes of hydrogen combined with 1 volume of oxygen to form 2 volumes of water vapour (all measured at the same pressure and temperature—these being, of course, such that the whole of the water formed was in the gaseous state); that 1 volume of hydrogen combined with 1 volume of chlorine to form 2 volumes of hydrochloric acid gas; and that similar simple relations existed in other cases. Gay-Lussac also noted that the numbers representing the atomic weights of elementary gases were simply related to the specific gravities of these gases.

Up to this period, although attempts had been made, notably by Dalton and Berzelius, to affix atomic weights to the elements, it had not been possible to do so with much certainty. An important step, however, towards definitely fixing the atomic weights of many elements was made by the experiments and observations of Dulong and Petit. These investigators, in 1819, called attention to the relation between the specific heats of the elements and their atomic weights. Generalising from their experiments on a number of the elements, Dulong and Petit concluded that what are now known as the *atomic heats* of all elements (that is, their specific heats multiplied by their atomic weights) were approximately the same. This conclusion might also be stated otherwise—viz. that the capacity for heat of elementary atoms is identical. Some notable exceptions to this generalisation were subsequently found, but the *law*, as it is called, of Dulong and Petit is substantially correct. To take some examples, the specific heat of potassium multiplied by its atomic weight ($\cdot 166 \times 39$) gives as product 6·5. In the case of iron, the number is 6·3 ($\cdot 112 \times 56$), and of mercury 6·4 ($\cdot 0319 \times 200$). These numbers are very nearly constant, but all are not quite so close. Although the deviation from the rule is, in some cases, considerable, still an atomic heat determination may be a most valuable assistance in fixing which of two or three numbers, each of which would sufficiently express the chemical relations of an element, should be adopted to represent its atomic weight. Other considerations have led in some cases to the fixing of a certain atomic weight for an element, but with the exception of what is known as Avogadro's Law, these need not be particularised here. Avogadro's Law is of the first importance, although its bearing was not recognised until many years after its promulgation, which preceded historically that of the law of Dulong and Petit.

Avogadro distinguished between elementary atoms, or the smallest particles, assumed to be indivisible, of an element, and molecules, or the smallest portion of a substance, possessing all the properties of the substance. His molecules were groups of 2 or more atoms, each group being capable of a separate existence. Avogadro's Law is based principally upon a critical study of the facts ascertained by Gay-Lussac in his investigation of the proportions by volume in which gases combine. Avogadro held that these facts received their simplest explanation by the assumption that a given volume of any gas, whether elementary or compound, contains the same number of molecules as the same volume of any other gas when measured at the same pressure and temperature. This law is in complete accord with the dynamical theory of gases. See article GAS.

If Avogadro's Law be adopted, it follows that the relative molecular weights of gases are proportional to their relative densities, whether the gases be elementary or compound. From this we are led to the conclusion that the molecules of some elementary gases, as of compound gases, consist of 2 or more atoms. Thus 2 volumes of hydrogen unite with 1 of oxygen to form 2 volumes of water vapour. Now, if 2 volumes of hydrogen contain twice as many molecules as 1 volume of oxygen, and the resultant 2 volumes of water vapour contain as many molecules as the original 2 volumes of hydrogen, it is obvious that in the formation of water each molecule of oxygen must be split into 2, and therefore that the molecule of oxygen must consist of at least 2 atoms. Again, 1 volume of hydrogen unites with 1 volume of chlorine to form 2 volumes of hydrochloric acid gas. The number of molecules at the end hence remains unchanged, but whereas each molecule then consists of hydrogen and chlorine, it is obvious that before the union the molecules must have consisted of hydrogen and hydrogen and of chlorine and chlorine respectively—i.e. each molecule of hydrogen and of chlorine must have consisted of at least 2 atoms. The molecules of a few metallic vapours consist only of single atoms. This is the case with mercury and zinc. The molecules of some non-metallic elements consist of more than 2 atoms. For instance, molecules of phosphorus and of arsenic vapours consist of 4 atoms.

The laws of Dulong and Petit, and of Avogadro, furnish the main evidence required for fixing the approximate values for the atomic weights of the elements. It would not be possible within the limits of this article to enter into the varied evidence, derived from chemical properties of substances, for assigning particular atomic weights to certain elements. Some examples of the kind of evidence must suffice. For many years the atomic weight of oxygen was all but universally stated as 8, compared with that of hydrogen as unity, instead of 16 as at present. Adopting this weight, the formula of water became HO, this being the simplest expression for the proportion (using, for the moment, round numbers instead of exact figures) of 1 part by weight of hydrogen to

8 parts by weight of oxygen. Now, we know that hydrogen and chlorine combine in the proportions by weight of 1 to 35·4 to form hydrochloric acid, and further, that not less than 35·4 parts of chlorine ever take the place of 1 part of hydrogen in combination. We further know a compound of potassium, oxygen, and hydrogen (potassium hydroxide or caustic potash), which contains these elements in the proportions by weight of 39, 16, and 1 respectively.

Methane contains carbon and hydrogen, and we learn that it must contain at least 4 atoms of hydrogen from the fact that, by suitable means, the hydrogen which it contains can be removed in four successive stages and its place taken by chlorine. In performing the first of these removals, or *replacements* as they are called, we find that 35·4 parts by weight of chlorine take the place of 1 part by weight of hydrogen. We do not know any means by which 8 parts of oxygen can be got to take the place of these 35·4 parts of chlorine, nor is there any instance known in the whole range of chemistry were the place of a single atomic proportion of chlorine (=35·4 parts) is taken by 8 parts of oxygen.

On treating the first chlorine derivative of methane with potassium hydroxide, we get potassium chloride, and the place of the chlorine is taken by 16 parts by weight of oxygen *and* 1 part by weight of hydrogen. The second chlorine derivative of methane (that in which half of the total hydrogen, or 2 atoms, is replaced by chlorine) has 2 parts by weight of hydrogen removed, and its place taken by $35{\cdot}4 \times 2$ parts by weight of chlorine. Corresponding to this there is an oxygen compound in which $35{\cdot}4 \times 2$ parts of chlorine are replaced by 16 parts of oxygen. Further, the next chlorine derivative of methane has an oxygen compound corresponding to it, which has the place of the $35{\cdot}4 \times 3$ parts of chlorine, taken by 16×2 parts of oxygen *and* 1 part of hydrogen. Finally, the last chlorine derivative of methane has a corresponding oxygen compound in which the place of the $35{\cdot}4 \times 4$ parts of chlorine is taken by 16×2 parts of oxygen.

It will be noticed that only in those cases where an even number of atomic proportions of chlorine is present, is the place of the latter taken by oxygen alone. In the other cases chlorine is replaced by oxygen *and hydrogen*. Thus we see that we do not get 1 atom of oxygen, weighing 8, simply taking the place of 1 of hydrogen, weighing 1, but 16 parts by weight of oxygen take the place of 2 of hydrogen. These facts can all be easily explained by assuming the atomic weight of oxygen to be 16, when the formula for water becomes H_2O, and the other facts mentioned above may be expressed symbolically as under:

Methane has the composition CH_4. The four chlorine derivatives with the corresponding oxygen (and hydroxy-) compounds are:

CH_3Cl	CH_3OH	$CHCl_3$	$CHOOH$
CH_2Cl_2	CH_2O	CCl_4	CO_2

Such is an example of one of the varied kinds of chemical evidence for approximately fixing a particular atomic weight. When this approximate value has been arrived at, there remains the question of determining the exact atomic weight as compared with that of the element (hydrogen or oxygen) chosen as standard. This involves the determination, by the most accurate methods available of the quantitative composition of the oxide, chloride, or some other appropriate compound of the element, and, from the results obtained calculating the required value. Below is a list of the elements at present known and of their atomic weights as fixed by the different kinds of evidence obtained by numerous, and in many cases varied, experiments. The values are all referred to oxygen as standard with atomic weight 16. This standard has been almost uniformly adopted by chemists, as, upon the whole, more satisfactory than H=1.

Name.	Symbol.	Atomic Weight.
Aluminium	Al	26·97
Antimony (*Stibium*)	Sb	121·8
Argon	A	39·88
Arsenic	As	74·96
Barium	Ba	137·4
Bismuth	Bi	209·0
Boron	B	10·82
Bromine	Br	79·92
Cadmium	Cd	112·4
Cæsium	Cs	132·8
Calcium	Ca	40·07
Carbon	C	12·00
Cerium	Ce	140·2
Chlorine	Cl	35·46
Chromium	Cr	52·0
Cobalt	Co	58·97
Columbium	Cb	93·5
Copper (*Cuprum*)	Cu	63·57
Erbium	E	167·7
Fluorine	F	19·00
Gadolinium	Gd	157·3
Gallium	Ga	69·72
Germanium	Ge	72·60
Glucinum	Gl	9·02
Gold (*Aurum*)	Au	197·2
Hafnium	Hf	178·6
Helium	He	4·00
Hydrogen	H	1·008
Indium	In	114·8
Iodine	I	126·92
Iridium	Ir	193·1
Iron (*Ferrum*)	Fe	55·84
Krypton	Kr	82·9
Lanthanum	La	138·9
Lead (*Plumbum*)	Pb	207·2
Lithium	Li	6·94
Magnesium	Mg	24·32
Manganese	Mn	54·93
Mercury (*Hydrargyrum*)	Hg	200·6
Molybdenum	Mo	96·0
Neodymium	Nd	144·3
Neon	Ne	20·2
Nickel	Ni	58·68
Niton	Nt	222
Nitrogen	N	14·008
Osmium	Os	190·9
Oxygen	O	16·00
Palladium	Pd	106·7
Phosphorus	P	31·04
Platinum	Pt	195·2
Potassium (*Kalium*)	K	39·10
Praseodymium	Pr	140·9
Radium	Ra	226·0
Rhodium	Rh	102·9
Rubidium	Rb	85·5
Ruthenium	Ru	101·7
Samarium	Sa	150·4
Scandium	Sc	45·10
Selenium	Se	79·2
Silicon	Si	28·06
Silver (*Argentum*)	Ag	107·88
Sodium (*Natrium*)	Na	23·00
Strontium	Sr	87·6
Sulphur	S	32·07
Tantalum	Ta	181·5
Tellurium	Te	127·5
Terbium	Tb	159·2
Thallium	Tl	204·4
Thorium	Th	232·1
Thulium	Tu	169·4
Tin (*Stannum*)	Sn	118·7
Titanium	Ti	48·1
Tungsten (*Wolfram*)	W	184·0
Uranium	U	238·2
Vanadium	V	51·0
Xenon	X	130·2
Ytterbium	Yb	173·5
Yttrium	Yt	89·0
Zinc	Zn	65·37
Zirconium	Zr	91·2

It has been stated in the foregoing that 1 atom of oxygen is regarded as combining with 2 of hydrogen to form water, and that 1 atom of chlorine combines with 1 of hydrogen to form hydrochloric acid. These are not the only variations in the number of hydrogen atoms which unite with 1 atom of another element to form a compound. Thus in ammonia we have 1 atom of nitrogen united with 3 of hydrogen; in methane 1 of carbon

united with 4 of hydrogen. Similarly, in many metallic chlorides the number of atoms of chlorine for 1 of metal varies, as, for instance, in KCl, $CaCl_2$, $BiCl_3$, $SnCl_4$, &c. Again, the oxides corresponding to these chlorides are respectively K_2O, CaO, Bi_2O_3, SnO_2, &c.; while we know other compounds in which 1 atom of potassium exists in combination with 1 of bromine or iodine; 1 atom of calcium with 1 of sulphur or 2 of fluorine; 1 atom of antimony with 3 of hydrogen, or 2 of antimony with 3 of sulphur, and so forth. From these examples it will be clear that the atoms of the elements possess different *exchange values* in replacing one another in chemical compounds. This exchange value of an element has been called its *valency*. 1 atom of chlorine combines with 1 of hydrogen or 1 of potassium, and these three elements are said to be *univalent*. Calcium, oxygen, and sulphur, are *bivalent;* nitrogen (in ammonia at least), antimony, and bismuth, *trivalent;* carbon and tin, *quadrivalent*, &c. Some elements possess more than one valency, as, for example, phosphorus, which forms 2 chlorine compounds, PCl_3 and PCl_5, iron which also forms two, $FeCl_2$ and $FeCl_3$, and there are numerous other instances.

What is known as the *equivalent* of an element is that proportion of an element which is capable of taking the place of 1 atom of a univalent element. Thus, 39·1 parts of potassium combine with 35·46 of chlorine to form potassium chloride. The equivalent quantity of calcium is not 40·07 parts (for that quantity of calcium combines with 35·46 × 2 parts of chlorine) but $\frac{40{\cdot}07}{2} = 20{\cdot}035$ parts. 20·035 is therefore the equivalent weight of calcium. Faraday has shown that those quantities of various elements are chemically equivalent which are separated from various electrolytes by the passage through them of the same quantity of electricity. See ELECTRICITY, GALVANI.

When the elements are arranged in progressive order of their atomic weights, a certain regularity of succession of chemically analogous elements is observed. Attention was drawn to this by Newlands, and the matter was more fully developed by Lothar Meyer and especially by Mendeleëff, who formulated the *Periodic Law*. This law states that the properties of an element are functions of its atomic weight. The regularity of the recurrence of the cycles or periods is so striking that the appearance of gaps in the list led to the prediction, subsequently verified, of undiscovered elements (notably gallium and germanium), and of their probable physical and chemical properties.

The following table gives a list of the elements arranged according to the periodic system of Mendeleëff. The figures printed in italics above the various symbols give the *atomic numbers* of the respective elements (see PHYSICAL CHEMISTRY).

GROUPS	O.	I.	II.	III.	IV.	V.	VI.	VII.	VIII.
Series 1	....	*1* H 1·008	....	....	....	....	....	....	
2	*2* He 4·00	*3* Li 6·94	*4* Gl 9·02	*5* B 10·82	*6* C 12·00	*7* N 14·008	*8* O 16·00	*9* F 19·00	
3	*10* Ne 20·2	*11* Na 23·00	*12* Mg 24·32	*13* Al 26·97	*14* Si 28·06	*15* P 31·04	*16* S 32 07	*17* Cl 35·46	
4	*18* A 39·88	*19* K 39·10	*20* Ca 40·07	*21* Sc 45·10	*22* Ti 48·1	*23* V 51·0	*24* Cr 52·01	*25* Mn 54·93	*26* Fe 55·84; *27* Co 58·97; *28* Ni 58·68.
5	....	*29* Cu 63·57	*30* Zn 65·37	*31* Ga 69·72	*32* Ge 72·60	*33* As 74·96	*34* Se 79·2	*35* Br 79·92	
6	*36* Kr 82·9	*37* Rb 85·5	*38* Sr 87·6	*39* Yt 89·0	*40* Zr 91·2	*41* Cb 93·5	*42* Mo 96·0	....	*44* Ru 101·7; *45* Rh 102·9; *46* Pd 106·7.
7	....	*47* Ag 107·88	*48* Cd 112·4	*49* In 114·8	*50* Sn 118·7	*51* Sb 121·8	*52* Te 127·5	*53* I 126·92	
8	*54* Xe 130·2	*55* Cs 132·8	*56* Ba 137·4	*57* La 138·9	*58* Ce 140·25	....	....	....	
9	....	....	....	....	....	....	....	....	
10	....	....	....	*70* Yb 173·5	*72* Hf 178·6	*73* Ta 181·5	*74* W 184·0	....	*76* Os 190·9; *77* Ir 193·1; *78* Pt 195·2.
11	....	*79* Au 197·2	*80* Hg 200·6	*81* Tl 204·4	*82* Pb 207·2	*83* Bi 209·0	....	....	
12	*86* Nt 222	....	*88* Ra 226·0	....	*90* Th 232·1	....	*92* U 238·2	....	

In this table each horizontal line forms a period or cycle of the elements, and the various groups arranged in columns contain elements which exhibit chemical analogies and similarities that are often very striking. Those elements included under Group VIII. are exceptional. In each series where they occur we find a set of three elements which Mendeleëff calls *transition elements*, as they occur between the end of one and the beginning of the next *long period* or term of two series. Mendeleëff's early tables contained only the groups numbered I. to VIII. After the discovery of argon and the kindred elements helium, neon, krypton, xenon, and niton, all of which are characterised by zero valency, provision was made for these elements in Group O. The following are the names and the atomic numbers of some less fully investigated elements, a number of which cannot be appropriately placed in Mendeleëff's original table: 43, Masurium; 59, Praseodymium; 60, Neodymium; 61, Illinium; 62, Samarium; 63, Europium; 64, Gadolinium; 65, Terbium; 66, Dysprosium; 67, Holmium; 68, Erbium; 69, Thulium; 71, Lutecium; 75, Rhenium; 84, Polonium; 89, Actinium; 91, Protoactinium.

A marked periodicity is noticed in the *atomic volumes* of the elements (that is, in the quotients of the specific gravities of the solids divided by

their atomic weights) in each of Mendeleëff's series. For this subject, and the periodic law generally, see Mendeleëff's *Principles of Chemistry* (2 vols. 1905), or any of the larger modern text-books of chemistry.

Atomic Weight. See Atomic Theory.

Aton, or Aten, an Egyptian god, whose symbol was the sun's disk with rays each ending in a hand, signifying universal agency and power, and whose cult was established as a monotheistic religion of universal claims by Amenhotep IV. In accordance with the change the king had the name of Amon erased from all monuments, changed his own name to Ikhnaton or Akhnaten, and removed his capital to Akhetaten (Amarna).

Atonement, the mediation necessary for restoring the union between God and man lost by sin. The Christian doctrine of the atonement is but the explanation of its great central dogma—the embodiment in one person of the divine and human natures in perfect agreement. In the person of Christ, God and man are made at one: he is their Atonement. The various churches agree in resting the sinner's hope of salvation on the mediatorial work or atonement of Jesus Christ. Nevertheless, from the very beginning of speculative Christian theology, there have been various ways of conceiving and explaining the nature and mode of operation of this mediatorial work. 'Modern' Christianity tends to build less—or not at all—on the foundation of one historic act of substituted sacrifice; it is the life, not the death, of Jesus that feeds the faith of the 'moderns;' and for them the process of atonement demands the active co-operation of every soul here and now in reconciling and bringing into harmony the conflicting and discordant traits and tendencies which infest the inner and the outer life of man. In Judaism the law of God awakened the sense of guilt, and the desire for an atonement—a desire it could never satisfy. The Old Testament insists on atonement by vicarious Sacrifice (q.v.), but the idea of the suffering and vicarious Messiah was foreign to the Messianic faith of the great body of the people.

In the New Testament, Christ is the Mediator between God and man, having made peace through the blood of his cross; the propitiation for our sins; and our high-priest who offers himself a sacrifice to reconcile us with God. God has in Christ reconciled the world with himself. The sufferings and death of Christ were ever regarded as of primary and essential importance in his work of redemption; but we look in vain throughout the early centuries of the Christian Church for anything like a systematic development of the doctrine of the atonement. The germs of the doctrine existed, but without any logical connection or clearness. The early church fathers dwell with a sort of inspired devotion upon those facts of the gospel which represent Christ as the sacrifice for our sins, as the ransom paid for our redemption, as our deliverer from the power of Satan, as the restorer to mankind of whatever was lost by the fall of Adam; but they seldom attempt to show *how* these results connect themselves with the sufferings and death of Christ; neither do they show in what manner the atonement has objectively been made, nor how it is brought to the experience of its individual subjects. Throughout the whole earlier age of the church down to the time of Anselm, the belief was generally prevalent that Christ was offered by God, as a ransom for his people, to Satan, who held them by the power of conquest; this was specially emphasised by Origen and Irenæus. Gregory of Nyssa explained that the devil consented to receive Jesus as a ransom, because he regarded him as more than an equivalent for all those under his power; but that, notwithstanding his subtlety, he was outwitted, for, owing to the humiliation in which Christ was veiled, he did not recognise him as the Son of God, and consequently was himself deceived. But having consented to receive him as a ransom for mankind, he was righteously deprived of his dominion over man, whilst he could not retain Jesus when he discovered him to be the Holy One of God. St Augustine pointed out that the devil had overstepped his power in thinking he could treat the sinless Jesus as a slave, like the other sons of Adam who belonged to him as prisoners; but he lost his right to the latter so far as they belong to Christ. The idea of a penalty endured on the part of God (as the incarnate Logos) gained the predominance after its advocacy by Athanasius. But the doctrine of the atonement was not presented in its final form until the subtle genius of Anselm reduced the confused conceptions of the early fathers to strict dogmatic definitions, and adjusted the apparent contradiction between divine love and divine justice and holiness. It is the doctrine of vicarious *satisfaction*, which, under various modifications, has ever since continued to be held as the orthodox doctrine of the church. The infinite guilt which man had contracted, by the dishonour of his sin against the infinitely great God, could be atoned for by no mere creature; only the God-man Christ Jesus could render to God the infinite satisfaction required. God only can satisfy himself. The human nature of Christ enables him to incur, the infinity of his divine nature to pay, this debt. But it was incumbent upon Christ as a man to order his life according to the law of God; the obedience of his life, therefore, was not able to render satisfaction for our guilt. But although he was under obligation to live in obedience to the law, as the Holy One he was under no obligation *to die*. Seeing, then, that he nevertheless voluntarily surrendered his infinitely precious life to the honour of God, a recompense from God became his due, and his recompense consists in the forgiveness of the sins of his brethren. In this form of the doctrine we are taught the necessity of an active vicarious satisfaction; but Anselm nowhere teaches the passive satisfaction, he nowhere says that Christ endured the punishment of men. Nor do we find in his writings the development of the subjective side of the doctrine—namely, how the satisfaction rendered to God mediates the atonement in the experience of the believer. According to Anselm, the satisfaction rendered by Christ was greater than the guilt for which he atoned; and it needed to be greater, for the payment of the debt due to God gave men no claim to the favour of God. Abelard attached principal importance to the *moral* aspect of the doctrine, and declared the love of Christ the redeeming principle, inasmuch as it calls forth love on our part. Thomas Aquinas and his followers maintained Augustine's opinion of the infinite value of the blood of Christ rendering it more than sufficient; while the Scotists maintained that it was sufficient only because God was pleased to regard it as sufficient.

Protestant theologians extended the idea of vicarious suffering, so as to make it include the divine curse, an opinion against which Bellarmine protested as 'a new unheard-of heresy,' while, on the other hand, they insisted on the active obedience of Christ, together with the passive, referring the former to the complete obedience which he yielded to the law. With the Roman Catholic theologians, the death of Jesus remits guilt contracted before baptism, and its punishment. For sins committed after baptism, it remits the repentant sinner's guilt and (for mortal sins) the eternal punishment: it remains for him to make

satisfaction by temporal punishment for all sins. They also asserted that the merits of Christ were supererogatory, while Protestants thought they were equivalent to the penalties to be inflicted upon men. Among the Protestants themselves, the Reformed Church approximated more nearly to the Scottish *acceptilatio* than did the Lutherans. According to Calvin, although the life of Christ is to be regarded as paying the price necessary for our deliverance, the Scriptures ascribe our redemption especially to his death. He says little or nothing about Christ's fulfilling the law for us, but dwells upon his delivering us from its curse. He does not, therefore, exhibit his active obedience separated from his passive obedience. And the great importance attached to his death is drawn rather from the view of its subjective necessity than from the idea of the divine righteousness. Calvin's view differs from that of the Lutheran *Concordienformel* in that he does not regard the relationship of God to man so much through the negative notion of a Redeemer from guilt and punishment, but looks upon Christ as the highest Mediator, through whom the nature of God is communicated to man. 'Modern Calvinism' represents the atonement as that satisfaction for sin which was rendered to God, in his public character as moral governor of the world, by the perfect obedience unto death of our Lord Jesus Christ. The nature of this satisfaction was a moral, not a pecuniary satisfaction. The value of the sufferings of Christ consists in their tendency to uphold the divine moral government unimpaired, whilst pardon is extended to those who have violated it. There was a moral necessity for Christ's sufferings and death—obstacles to the bestowment of pardon had to be removed—the influence of the Holy Spirit had to be secured. The whole contents of Christ's earthly existence, embracing both his active and passive obedience, must be regarded as contributing to the atonement which he made. As to the 'extent' of the atonement, a broad distinction is to be made between the *sufficiency* of the atonement and its *efficiency*. Such is the modified view of the doctrine as advocated by Dr Payne, Pye Smith, Wardlaw, and many others. The earlier form found in the writings of Owen and Edwards maintains that the atonement was made only for the elect; and that its necessity with respect to them arose out of the eternal justice of God, which required that every individual should receive his due desert.

The teaching of Socinus is a re-statement of the *Moral Influence* theory first distinctly taught by Abelard. It represents man as attaining to oneness with himself and with God by his own moral energy. It rejects that idea of the righteousness of God which makes it impossible for him to forgive sin without a satisfaction, as imposing finite limitations upon the divine Being; disapproves the doctrine of satisfaction, on the ground that satisfaction for sin and forgiveness of sin are incompatible with each other; and objects that sin and punishment are of so personal a nature as not to allow of their being transferred. The doctrine it sought to establish was that man is reconciled to God by repentance and reformation. In this purely subjective theory, repentance occupies the place of faith in the orthodox doctrine, and faith becomes identical with obedience. The sufferings of Christ were necessary in order that he might become our example, and be better fitted to render us help; that we might have a pledge and guarantee of the divine forgiveness; and as conditioning his resurrection and ascension to glory.

The Arminians endeavoured to take an intermediate position between the theory of Socinus and the satisfaction theory of Anselm. They asserted that the design of Christ was to render a sacrificial oblation in behalf of all men indiscriminately, by which 'sufficient grace' is meritoriously secured for each, and their sins rendered remissible upon condition of faith. They maintained that the doctrine that Christ satisfies in our behalf the preceptive demands of the law by his active obedience, as well as the penal demands by his passive obedience, leads to Antinomianism.

Grotius drew a subtle distinction between *satisfactio* and *solutio*, and taught that God, by inflicting death on Christ, had given in an arbitrary way an example of punishment. His atonement theory is known as the *Governmental* theory. According to it God's justice is not vindicatory, but may be referred to a general governmental rectitude based on a benevolent regard for the well-being of the subjects of his moral government. Law is a product of the divine will, and therefore relaxable. God's sovereign prerogative includes the right of pardon. God so conditions the pardon of human sinners, by selecting such an example of suffering that man may not think he can sin with impunity. Christ's sufferings, then, were not punishment, but an example of a determination to punish hereafter. They were not to satisfy divine justice, but to impress the mind of the moral universe with a sin-deterring motive. This view is substantially the same as that held by the younger Edwards in America. After Grotius, Limborch emphasised the idea of a sacrifice, as set forth in the Old Testament, which the theologians previous to Anselm had generally adopted. This theory was introduced into the Arminian works on theology, and approved by the Socinians of the next period. The Quakers admitted that redemption has once been made by the death of Christ, but connected with it the idea of a second redemption realised internally. This second reconciliation they regarded as the essential redeeming principle.

According to what is often called the *Mystical* theory, the reconciliation effected by Christ was brought about by the mysterious union of God and man, accomplished by the incarnation, rather than by his sacrificial death. This view was not confined to the Platonising fathers or the disciples of Scotus Erigena, but was held by Osiander and Schwenkfeld at the Reformation, and by the school of Schleiermacher, the most spiritual among modern theologians. The last connected the doctrine of the vicarious sufferings and perfect obedience of Christ with his sinlessness and the doctrine of his priestly office, but separated the substitution and the satisfaction so as to represent Christ's sufferings as only vicarious, but not as making satisfaction; and his obedience as making satisfaction, but not as vicarious. The redeeming and atoning principle is not the single fact that Christ died, but a vital union with him. By means of this we appropriate to ourselves Christ's righteousness (his obedience unto death); this appropriation, however, is not to be confounded with the mere external theory of vicarious satisfaction. Christ's passive obedience is merely the crown of his active obedience.

The following are the statements of three modern representative English theologians: (1) J. J. Tayler, as representing the view of modern Unitarianism, which has followed naturally from the 'moral influence' theory of Socinus and earlier of Abelard; (2) Dr J. M'Leod Campbell, whose 'sympathy theory' was a spiritual outgrowth from Calvinism; (3) F. D. Maurice, the representative of the modern 'Broad Church' School, which approximates to the 'moral influence' theory. A fourth characteristic view is outlined in the article RITSCHL.

(1) Dr Tayler says: There is *one* mediator between God and men, the man Christ Jesus. This can only refer to unrivalled pre-eminence, not to

exclusive function. For all higher minds do, in fact, mediate between their less gifted fellow-creatures and the great realities of the invisible world. This '*one*' is a *human* mediator, 'the man Christ Jesus'—not a being from another sphere, an angel or a God—but a brother from the bosom of our own human family. 'He gave himself a ransom for *all*' who embrace his offers and will hearken to his voice. He brings from God a general summons to repent; and with that he conveys, through faith, a spiritual power to shake off the bondage of sin, and put on the freedom of a new heart and a new life. He is a deliverer from the power of sin and the fear of death. This is the *end* of His mediation. This is the redemption of which he paid the price. His death, cheerfully met in the inevitable sequence of faithful duty, was only one among many links in the chain of instrumentalities by which that deliverance was effected. It was a proof, such as could be given in no other way, of trust in God and immortality, of fidelity to duty, and of love for mankind. In those who earnestly contemplated it, and saw all that it implied, it awoke a tender response of gratitude and confidence, which softened the obdurate heart, and opened it to serious impressions and the quickening influences of a religious spirit.

(2) Dr John M'Leod Campbell says: The work of the Son of God who came to do and did the will of his Father must, in view of the deliverance which he wrought, be regarded as twofold: first, as dealing with man on behalf of God, and second, as dealing with God on behalf of man. In dealing with man on behalf of God, Christ revealed to us the Father in his relation to a sinful world, showed us what our sins were to God, vindicated in the world the Father's name, and witnessed to the excellency of that will against which we were rebelling. In thus revealing the will of the Father towards sinful men, he necessarily became a man of sorrow and suffering, but these arose naturally out of what he was, and the relation in which he stood to those for whom he suffered; and to the holiness and love of his very nature must we refer their awful intensity and immeasurable amount. He suffered what he suffered just through seeing sin and sinners with God's eyes, and feeling in reference to them with God's heart. By what he suffered, he condemned sin, and revealed the wrath of God against it. His holiness and love taking the form of suffering, compose the very essence and adequacy of his sacrifice for sin.

Again, in dealing with God on behalf of man, the oneness of mind with the Father which towards man took the form of condemnation of sin, became in his dealing with the Father in relation to us a perfect confession of our sins, which was a perfect Amen in humanity to the judgment of God on the sin of man. Such an Amen was due in the truth of all things, due on our behalf, though we could not render it, due from him as in our nature and our true brother. He who was the truth, could not be in humanity and not utter it. This confession of our sins by him who, as the Son of God and the son of man in one person, could perfectly realise the evil of man's alienation—this Amen from the depths of the humanity of Christ to the divine condemnation of sin, has all the elements of a perfect repentance in humanity, for all the sin of man—all except the personal consciousness of sin; and by that perfect response or Amen to the mind of God, in relation to sin, is the wrath of God rightly met, and that is awarded to divine justice which is its due, and could alone satisfy it. This confession of the world's sin by the Head and Representative of humanity, was followed up by his intercession as a part of the full response of the mind of the Son to the mind of the Father. 'He bore the sins of many, and made intercession for the transgressors.'

(3) F. D. Maurice professed to hold a purely biblical theology, as opposed to the theologies of consciousness, which he repudiated. His doctrine of the atonement is the answer which the Bible gives to the demands of a sin-smitten conscience. A sinner requires, and is content to be told on the authority of Scripture, that the Son of God has taken away sin. This message from God is the gospel for all men. The sinner wants to be assured that God has spoken, that he has declared himself the Reconciler, and desires to be shown how and in whom he has accomplished that work on his behalf.

To this question—How and in whom the work of reconciliation has been accomplished—Maurice replied as follows: The will of God is set forth in the Bible to be a will which is good to all, and the ground of all that is right, true, just, and gracious; the Bible also sets forth the Son of God as being one in will, purpose, and substance with the Father, and shows that his whole life on earth was an exhibition of, and submission to his Father's will. The Son of God was Lord of men, the Root and Head of humanity, and the source of all light and righteousness in man. Being thus one with God and one with man, he brought the will of God into our nature, and fulfilled it in our nature perfectly. In the fulfilment of this will in our nature, as its head, he shared its sufferings, enduring that wrath or punishment which proceeded from Holy Love; thus realising, on the one hand, the sins of the world, and on the other, the consuming fury of the holiness of the love of God, with an anguish which only a perfectly pure and holy Being, who is also a perfectly sympathising and gracious Being, can feel. The man Christ Jesus was for this reason the object of his Father's continual complacency—a complacency fully drawn out by the death of the cross—which so perfectly brought out to view the uttermost power of self-sacrifice which lay hidden in the divine love, and consequently he exhibited humanity, in its head, atoned for, reconciled.

See the great work of Ritschl (trans. 1901); the histories of dogma by Hagenbach and Harnack; the relevant works of Baur, Magee, M'Leod, Campbell, Dale, Crawford, Maurice, Thomson, J. J. Tayler, Oxenham; *The Atonement in Modern Religious Thought*, by Harnack, Fremantle, Sabatier, Dods, Godet, and Munger (1900); Moberley, *The Atonement and Personality* (1901); Denney, *The Atonement and the Modern Mind* (1904); Stevens, *The Christian Doctrine of Salvation* (1906); Rashdall, *The Idea of Atonement* (1920); also CHRISTIANITY, JESUS CHRIST, PREDESTINATION, SACRIFICE, &c.

Atonement, DAY OF. See FAST.

Atossa, daughter of Cyrus and wife successively of Cambyses, Smerdis, and Darius Hystaspes, said to have been put to death by Xerxes, her son by Darius.

Atoxyl, an arsenic compound, helpful in Sleeping Sickness (q.v.), but apt to cause blindness.

Atra'to, a river of Colombia, interesting because it was repeatedly made to bear a part in schemes for a ship-canal across the Isthmus of Panamá. Rising on the Western Cordillera at an altitude of 10,560 feet above sea-level, it runs 305 miles northward through low, swampy, and unhealthy country in the department of Cauca, and falls by several mouths, interrupted by bars, into the Gulf of Darien, through the bay of Uraba on its western side. It is navigable by steamers for fully 250 miles, being 750 to 1000 feet wide, and 8 to 70 feet deep. A route, surveyed by the United States government in 1871, proposed to connect the Atrato and the Jurador, flowing into the Pacific, by a canal 48 miles long. At the Paris International

Congress (1879) for deciding the best route for the interoceanic canal, that route was, with various others, discussed and rejected in favour of De Lesseps's line from Limón to Panamá. Gold-dust and platinum are found in and about the Atrato.

Atrauli (*Atrowli*), a town of British India, in the United Provinces, 16 miles NE. of Aligarh. Founded about the 12th century, it is well built, with wide streets, a good bazaar, and an abundant supply of water. Pop. 13,000.

Atrek, a river of Persia, rising in Khorasan, among the Hazár Masjid Mountains, and thence flowing nearly 350 miles westward to the Caspian Sea, from Shatt downwards along the boundary with Transcaspia. Its width at the mouth is usually only 30 feet, but in the spring tides it overflows its banks to a width of over two miles.

Atreus, son of Pelops, grandson of Tantalus, and elder brother of Thyestes. He was married first to Cleola, who bore him Pleisthenes, then to Ærope, who had been wife of his son Pleisthenes, and who bore him Agamemnon and Menelaus, and lastly to Pelopia, daughter of his brother Thyestes. Having to flee for the murder of his half-brother Chrysippus, he came along with Thyestes to Mycenæ, and ultimately became its king. Here his wife Ærope was seduced by Thyestes, who, when banished for this outrage, sent Pleisthenes to slay Atreus, but the latter slew the youth instead, not knowing him at the time to be his own son. In revenge he killed the two sons of Thyestes, and placed their flesh before the father at a banquet ostentatiously made to celebrate the reconciliation. The unhappy father fled in horror, and the vengeance of heaven, in the shape of famine, fell on Atreus for his abominable atrocity. Advised by the oracle to call back Thyestes, he went to search for him, and at the court of King Thesprotus married his third wife Pelopia, whom he believed to be a daughter of Thesprotus, but who was really a daughter of Thyestes, and at the time with child by him. This child, Ægisthus, afterwards slew Atreus when commissioned by the latter to slay his own father Thyestes. The tragic fate of the house of Pelops gave materials to the great tragic poets of Greece, whom Milton in his *Il Penseroso* speaks of as 'presenting Thebes or Pelops' line.' See MYCENÆ.

Atri, or ADRIA. See ADRIA.

At'riplex. See CHENOPODIACEÆ and ORACHE.

Atrium, in Roman Architecture, was the hall which formed the chief part of a Roman house; into it one entered from the vestibule by the main door. It was lighted from the roof, which sloped towards an opening in the centre (the *compluvium*), through which the rain-water flowed into a kind of cistern situated on the floor (the *impluvium*). On both sides, passages led to the several chambers, and behind it was the roofless *cavædium*. In early Rome, the family gods and the nuptial couch stood in the atrium, which was used as the common public apartment, where the mistress and her maids sat spinning; but in later times it was reserved as a general waiting-room for visitors and clients.—In ecclesiastical architecture, the atrium was an open court before a church, where penitents and others stood to solicit the prayers of the faithful.

At'ropa. See BELLADONNA.

Atropatene, NW. Media, now Azerbaijan.

At'rophy (Gr. *a-*, 'not,' and *trophē*, 'nourishment'), an alteration of the vital processes in a living organism, either animal or vegetable, resulting in a diminution in size and functional activity of the whole organism (general atrophy), or of certain of its organs or tissues. It may be a natural process, as in atrophy of the thymus gland during childhood, or in general atrophy of old age, but is much more commonly the result of disease or injury. It may be caused (1) by a deficient supply of nourishment, as by starvation, or by pressure on the arteries supplying a part with blood, as when beggars produce atrophy of their muscles by tight bandaging of their limbs; (2) by excessive waste of tissue, as in fevers; (3) by diminished functional activity; (4) by loss of nerve-control, as when the skin wastes in locomotor ataxia, leprosy, &c.; and (5) by certain poisons, such as iodine, lead. Compare HYPERTROPHY.

Atropine, or ATROPIA, $C_{17}H_{23}NO_3$, is an alkaloid existing in all parts of the deadly nightshade (*Atropa Belladonna*). It is isomeric with hyoscyamine and hyoscine, and can be prepared from these. The best source is Egyptian henbane. The Thorn-apple (q.v.) yields Daturine, a mixture of atropine and hyoscine. Atropine may be prepared from the juice of belladonna by heating it to 194° F. (90° C.), filtering, and after addition of potash, shaking with chloroform. The crude alkaloid obtained after evaporation of the chloroform is purified by crystallisation from hot alcohol. The crystals occur in colourless silky needles, united in tufts. It is very poisonous, $\frac{1}{100}$th of a grain causing dryness of the throat; but it is nevertheless used internally or by injection in cases of hooping-cough and ptyalism. It is also used as an antidote in cases of opium poisoning. A solution of sulphate of atropia in water dropped into the eye is now generally preferred to belladonna lotions or ointments for eye diseases. It produces dilatation of the pupil and paralysis of the accommodation, which do not completely pass away for some days; and also a sedative and curative effect in many inflamed conditions. A solution of about four grains to the ounce is most often employed; but a single drop of a very much weaker solution affects the pupil.

At'ropos, one of the Fates. See FATE.

Attaché (Fr.), one attached to or connected with another, as a part of his suite or attendants. The term is specifically applied to young diplomatists on the staff of an ambassador.

Attachment is the form of process by the authority of which the person or the goods of a debtor may in certain specified cases (see DEBT) be seized in satisfaction. As a proceeding against the person, it is a species of criminal process, and has the force of much that will be found under ARREST (q.v.). In form, it is a writ addressed to the sheriff, commanding him to attach the person against whom it is issued, and have him before the court to answer for some act or default amounting to contempt of court. Thus, in Hawkins's Pleas of the Crown, such contempts are thus classed: (1) Disobedience to the Queen's writs; (2) Contempts in the face of a court; (3) Contemptuous words or writings concerning a court; (4) Refusing to comply with the rules and awards of a court; and (5) Forgery of writs, or any other deceit tending to impose on a court. Parties are also liable to the process of attachment as for a contempt of court where, in an arbitration (see ARBITRATION) the award having been made a rule of court, the parties refuse to obey the same. In Chancery, there may be attachment of the person for judicial default or other offence to the court, as, for example, where a defendant fails to put in a proper defence to the plaintiff's statement of claim. A witness who fails to attend when duly summoned is in such event considered to have committed a contempt of court, and to be liable to be punished for such contempt by attachment.

No attachment may be issued without the leave of the court, to be applied for on notice to the party against whom it issues.

The proceeding by attachment of debts or goods in hands of a third party resembles in some respects the Scots diligence or process of arrestment (see ARRESTMENT). The best illustration we can give of it, in this sense, is that relating to the power of a judgment creditor to recover under his judgment. Under the rules of court now in force, a judgment creditor may, on an *ex parte* application, obtain a garnishee order to attach debts owing to the debtor from any third person within the jurisdiction; and the third person or Garnishee (q.v.) may be ordered to attend and show cause why he should not pay his debt to the judgment creditor. This latter proceeding is the equivalent of the action of furthcoming in Scotland. The ordinary diligence of arrestment in execution against the movable estate of a debtor, as practised in Scotland, is in England not usually called attachment, but simply execution of judgment debt.

Foreign Attachment originated in the custom whereby the citizens of London, Bristol, Exeter, and Lancaster, when suing foreigners—i.e. debtors outside the city—were entitled before judgment to attach their goods or debts in the hands of a garnishee, and so compel them to appear and plead. It is still competent in the Mayor's Court of London, though not in the High Court of Justice. It resembles the Scottish procedure of arrestment in security and *ad fundandam jurisdictionem*. See ARRESTMENT.

In the United States, attachment may be defined as the taking into the custody of the law the person or property of one who is already before the court, or of one whom it is sought to bring before the court; also a writ for this purpose. To some extent it is of the nature of a criminal process. In some states, attachments are distinguished as foreign and domestic—the former issued against a non-resident having property within the jurisdiction of the state, the latter against a resident in the state; jurisdiction over the person or property being necessary for an attachment. An attachment issued under a state law which has not been adopted by congress, or by a rule of court, cannot be sustained in a United States court. Money due to a seaman for wages is not attachable in the hands of a purser, the purser being a distributing agent of the government, and in no sense the debtor of the seaman.

Attainder (through Fr. from Lat. *attingere*, 'to touch upon;' supposed erroneously to be through Fr. from Lat. *tingere*, 'to dye,' 'taint'), in English law, was the legal consequence of sentence of death or outlawry, in respect of treason or felony. An attainder may still be produced by a judgment of outlawry; but such judgments are not in practice now pronounced. The last was in 1859. It involved *forfeiture of estate* and *corruption of blood;* and generally it imported extinction of civil rights and capacities. Thus, an attainted person cannot sue in a court of justice; he loses all power over his property; and he is by his attainder rendered incapable of performing any of the duties, or enjoying any of the privileges of a free citizen. It was only in cases of treason that there was an absolute forfeiture of real estate. In cases of murder and other felony (and formerly the majority of crimes were felonies), the forfeiture of lands to the crown lasted only for a year and day; and even this limited forfeiture was in 1814 confined to the case of murder. But then in such cases, by the doctrine of corruption of blood, the heir of the traitor or felon was incapacitated from succeeding, and the land reverted to the lord or superior, who was frequently the crown. Legislation was passed at the time of the Jacobite rebellions to confine the effect of attainder to the person actually convicted, but it was not till 1833 that it became possible in England to trace descent through an attainted person. The forfeiture applied to honours and dignities as well as land; but where land or honours were entailed, it was held that the remainder-men or substitutes were unaffected. In Scotland, the whole law on this subject has been widely different. Forfeiture of movable estate (or escheat) occurred in every case of capital sentence—i.e. almost every felony in former times, and also in every case of outlawry. This must be distinguished from the penalty of escheat of movables which was by statute imposed for such crimes as deforcement, perjury, and bigamy. Some doubt exists as to how far *civil death* followed in the case of a condemned felon, as in the case of an outlaw. But in Scotland, except in cases of treason, the forfeiture never extended to the fee of real estate. There was a liferent escheat in favour of the superior, but even the outlaw retained a right of disposing of land. Nor was there in Scotland, except in the case of treason, anything resembling corruption of blood. Upon the other hand, the Scottish law of treason prior to the Union was in some respects more stringent than that of England. It forfeited all interests in an entailed estate or dignity. The laws of the two countries were assimilated by statute, which introduced to Scotland (though with less practical effect) the doctrine of corruption of blood. Those who desire to trace the effect of such laws on the political history of the time should examine Lord Hardwicke's work on the law of forfeiture. Formerly, an attainted person could not give evidence in a court of justice; but that disability in England has been removed by the 6 and 7 Vict. chap. 85, and in Scotland by the 15 and 16 Vict. chap. 27.

In 1870 the law on this subject was revised by the Act 33 and 34 Vict. chap. 23—which does not, however, extend to Scotland. No conviction for treason or felony now causes any attainder or corruption of blood, or forfeiture or escheat. When a convicted person is sentenced to any punishment more severe than twelve months' hard labour, he is deprived of any public office or employment, and of any public pension, or of the right of voting at elections. He may be condemned to pay the costs or expenses incurred in procuring his conviction, and in cases of felony to make payment of a sum not exceeding £100, as compensation for any loss of property caused by such felony. He cannot sue for any property, debt, or damage. While he is a convict undergoing any imprisonment, the sovereign may appoint paid administrators to take charge of his property at the convict's expense, to deal with the property, and pay debts, and do what is needful. They may also pay out of his property satisfaction for any loss or injury suffered by third parties in consequence of his criminal or fraudulent acts, though no proof of such criminal or fraudulent acts may have been made in any court of law. They may also make allowances to support the convict's family. If the crown does not appoint an administrator, justices of the peace may appoint interim curators, if satisfied that it will benefit the convict or his family, or the due administration of his property and affairs. Should any person intermeddle with the convict's property, the Attorney-general or next of kin may call them to account. When the sentence expires, then the administrators or curators are to account to him for his property. If during the sentence any property be acquired by the convict, it is not to vest in the administrators, but is to be his own.

Attainder was sometimes inflicted after death; thus, four of the regicides—Cromwell, Ireton,

Bradshawe, and Pride—were attainted posthumously.

In the United States, attainder, as it existed in England prior to the Act 33 and 34 Vict., is absolutely unknown. The Constitution of the United States forbids the enactment of any bill of attainder by congress or any of the states. Prior to the adoption of the Constitution, it was held that state laws banishing the persons and confiscating the property of individuals named for their treason, were valid; but an act of congress disbarring lawyers unless they would take an oath denying past acts of treason, has been held to be unconstitutional as a bill of attainder.

Bill of Attainder, and Bill of Pains and Penalties, are bills in parliament, introduced for penally enacting the attaint and punishment of persons who have criminally offended against the state and public peace. Such a legislative proceeding was had recourse to generally in times of turbulence, when, either from the peculiar nature of the offence, or in consequence of difficulties in the application of the ordinary laws, it became necessary to resort to parliament. During the reign of Henry VIII., persons of the highest rank were frequently brought to the scaffold by such means; among whom may be mentioned the Earl of Surrey, the Earl of Essex, and others, who suffered for denying the king's supremacy. The inquiry under a bill of attainder was entirely in the hands of parliament, who might dispense at their pleasure with such rules and forms of law as appeared inconvenient or unsuitable to the purpose in hand. Accordingly, the bills were often passed upon evidence which could never have been received as sufficient, or even admissible in a court of law; and there are even instances where parties were attainted, and punished, without there being any evidence against them at all, and even without their being heard in their defence. Under the Stuarts, this extraordinary mode of proceeding in parliament was seldom had recourse to in England, and it has been still more rarely used since the accession of the House of Hanover. It has been much debated whether the attainder of Strafford (q.v.) in 1641 was constitutional. The Jacobite movement in Scotland, after the union with that country, was productive of several instances of parliamentary attainder, which, however, resulted merely in the forfeiture of the estates of the attainted parties, and in many such cases the attainder has since been removed by statute. The last instance of bill of attainder for treason was that of Lord Edward Fitzgerald, one of the leaders of the Irish rebellion of 1798. In regard to bills of pains and penalties, perhaps the two most remarkable instances are those of Bishop Atterbury (q.v.), in 1722, and of Queen Caroline, wife of George IV., in 1820.

Those who are subjected to these proceedings are admitted to defend themselves by counsel and witnesses before both Houses. In the best of times, this summary power of parliament to punish criminals by statute should be regarded with jealousy; but whenever a fitting occasion arises for its exercise, it is undoubtedly the highest form of parliamentary judicature. In impeachments, the Commons are but accusers and advocates; while the Lords alone are judges of the crime. On the other hand, in passing bills of attainder, the Commons commit themselves by no accusation, nor are their powers directed against the offender; but they are judges of equal jurisdiction and with the same responsibilities as the Lords; and the accused can only be condemned by the unanimous judgment of the Crown, the Lords, and the Commons. See Sir T. E. May (Lord Farnborough), *Privileges of Parliament* (11th edition, 1906). See also Forfeiture, Impeachment, Treason.

Attalea, a tropical American genus of palms, of the coconut and oil-palm group. *A. cohune*, which covers about two-fifths of British Honduras, yields cohune nuts, from which cohune oil is got. *A. funifera* is the source of Coquilla Nuts (q.v.) and piassava (see Fibrous Substances). Some Brazilian species yield babassu nuts. See Palm.

Att'alus. See Pergamus.

Attar. See Otto of Roses.

Attempt, in the criminal law of England and of Scotland, is any act done with the intention of committing a crime, which can fairly be described as one of a series of acts which would constitute the crime, if uninterrupted and successful. According to the rule of English law, every attempt to commit an indictable crime is a misdemeanour, except that in a few cases—e.g. murder—the attempt is a felony. In Scotland before 1887 it was competent at common law to charge a person with attempting to commit an indictable crime. The act of 1887 is declaratory of the common law, and also enables a conviction for an attempt to be obtained under an indictment charging a completed crime; the attempt to commit an indictable crime is itself an indictable crime. Under 10 Geo. IV. chap. 38 an attempt to murder is a capital crime. In the United States also the attempt to commit a crime is punishable.

Atterbom, Peter Daniel Amadeus, Swedish poet, was born at Asbo in East Gotland in 1790, and in 1805 proceeded from the gymnasium of Linköping to the university of Uppsala, where he was appointed professor of Logic (1828) and of Æsthetics (1835). He died 21st July 1855. Atterbom was the leader of the Swedish Romanticists, called 'Fosphoristerna' from their organ *Phosphorus* (1810–14), of which he was editor, as also of the *Poetisk Kalender* (1812–22). His works, which present a curious blending of the hyper-romantic with German philosophy, fill thirteen volumes (1854–70). The best are *Lycksalighetens Ö* ('Island of Happiness'), and a cycle of romances, *Blommorna* ('The Flowers').

Atterbury, Francis, Bishop of Rochester, was born 6th March 1663, at Milton, near Newport-Pagnell, Buckinghamshire, and educated at Westminster School, whence in 1680 he passed to Christ Church, Oxford. In 1687 he gave proof of that ready controversial talent which distinguished him through life, in a reply to a pseudonymous attack on Protestantism by Obadiah Walker, master of University College. Taking orders about the same time, he won such reputation as a preacher, that he was appointed lecturer of St Bride's (1691), a royal chaplain, and minister to Bridewell Hospital. In 1698 a sensation was created in the learned world by the Hon. Charles Boyle's *Examination of Dr Bentley's Dissertations on the Epistles of Phalaris* (q.v.). This clever, but shallow performance was really composed by Atterbury, who had been the young nobleman's tutor at Christ Church. In 1700 he distinguished himself in a controversy with Dr Wake regarding the powers and privileges of Convocation. His zealous and caustic defence of the ecclesiastical against the civil authority, procured him the thanks of the lower House of Convocation, the archdeaconry of Totnes, a canonry of Exeter, and the degree of D.D. In 1704 he was promoted to the deanery of Carlisle; in 1710 was chosen prolocutor of Convocation; in 1712 became Dean of Christ Church; and in 1713 was made Bishop of Rochester and Dean of Westminster. To Atterbury is ascribed, with great likelihood, Dr Sacheverel's famous defence (1710) before the Lords; and he was author of the scarcely less famous *Representation of the State of Religion* (1711). He may well have aspired to the primacy; but the death of Queen Anne extinguished his hopes in

that direction. His known character and Jacobite leanings made him no favourite with George I. In 1715 he refused to sign the bishops' declaration of fidelity, and some of the most violent protests of the Peers against the government measures proceeded from his reckless pen. His deep complicity in a succession of plots for the restoration of the Stuarts at length brought down upon him the charge of treason, and in 1722 he was committed to the Tower. A bill of pains and penalties was brought into the House of Commons, and passed in the Lords by 83 to 43. Atterbury, who had defended himself with great ability, was deprived of all his ecclesiastical offices, and for ever banished the kingdom. In 1723 he quitted England, and after a short stay at Brussels, settled in Paris, where he died, 15th February 1732. He sincerely believed the Stewarts would be more favourable to the Church of England than the Hanoverians, and dreaded the latitudinarian or Socinian Whig bishops. Dean Beeching holds that if he had been content to become a staunch Hanoverian, he would have been made Archbishop of Canterbury. Pope, Swift, and Bolingbroke were amongst his friends. See Macaulay's article, his *Memoirs and Correspondence* by Williams (1869), and Dean Beeching's work on him (1909).

Attestation, in Conveyancing, is the verification of the execution of deeds and wills by witnesses; hence the clause at the end of these instruments which immediately precedes the signatures of the witnesses, is called the attestation clause (see DEED, WILL). In the Scottish practice, the corresponding clause is called the Testing-clause (q.v.).

Attic, a term in Architecture, employed to designate a low story rising above the cornice that terminates the main elevation of a building. Such a structure was usually of the *Attic order*, having square columns or pilasters instead of pillars. In domestic architecture, the word is usually applied to sky-lighted rooms in the roof.

Attica, one of the political divisions or states of Hellas or ancient Greece, of which Athens was the capital. Its area was about 640 sq. m., rather smaller than that of Lanarkshire. The territory is of triangular shape, having its north-east and south-west sides washed by the sea, while on the north it is connected with the mainland. In ancient times it was bounded on the W. by Megaris and the Saronic Gulf; on the S., which ran out into the 'marble steep' of Sunium, by the Ægean Sea; on the E. by the Ægean Sea; and on the N. by Bœotia, from which it was separated by a lofty range of hills, the most famous part of which was formerly called Cithæron. Ancient Attica was thus walled in from the rest of Greece; whilst within its own limits rose Mount Parnes (4634 feet), Pentelicon (3641), Hymettus (3368), Ægaleus (1535), Lycabettus (911), and the Athenian Acropolis (513). The largest plains extend in the neighbourhood of Athens and Eleusis. The two principal rivers were the Cephissus and Ilissus, which, if they exhibited the same features in ancient times as they do now, must have been mere mountain-torrents, dry in summer. The unfruitfulness of the soil, and the scarcity of water, compelled the inhabitants occasionally to send out colonies. As early, however, as the time of Solon, Attica was well cultivated, and produced wine and corn. Mount Hymettus was celebrated for its bees and honey, and metals were found in the range of Laurium. Figs, olives, and grapes are still cultivated. Goats and sheep find suitable pasturage; but the country does not now produce much grain. According to ancient tradition, the Autochthons of Attica were first civilised under Cecrops, who is said to have come thither from Sais, at the mouth of the Nile in Egypt, about 1550 B.C., and to have introduced the culture of olives, and of several species of grain, as also to have implanted milder manners, and taught the worship of the gods. He is stated to have divided the country into twelve communities or states. This, however, was not the only division known in early Attica. A still older division into *phylai*, or tribes, existed, as also a minute subdivision into *dēmoi*, or townships. By Theseus Athens was united with the eleven other states of Attica under one government, of which Athens was made the seat. After this union of the several states, the whole of Attica shared in the fortunes of Athens (q.v.), and, under Vespasian, became a Roman province. On the division of the Roman empire, Attica naturally fell into the hands of the Greek emperors. In 396 A.D. it was captured by Alaric, king of the Goths. What may have been its population in ancient times it is impossible to determine precisely. Clinton estimated it at upwards of half a million, but later estimates would give it a quarter to a third of a million. To-day Attica (with Bœotia) forms a nomarchy or government of Greece, with an area of 2300 square miles, and a population of over 580,000.

Atticus, TITUS POMPONIUS, was born in Rome 109 B.C., or three years before the birth of Cicero, along with whom and the younger Marius he received a good education. In 85 B.C. he withdrew to Athens, glad to be separated from the political distractions of his native land. After 65 B.C., when Sulla induced him to return to Rome, he still devoted himself chiefly to study and the pleasures of friendship, and refused to take any part in politics. Yet he was by no means without influence on public affairs, as he lived on terms of familiar intercourse with several leading statesmen, and freely gave his counsel, which was generally sound and wholesome, while it was always benevolent. He was a man of great wealth, having been left a large inheritance by his father and his uncle, which he greatly increased by judicious speculations. His mode of life was frugal. In 32 B.C. he was informed that a disorder under which he was labouring was mortal, and died after five days of voluntary starvation. An Epicurean in philosophy, he was intimately acquainted with both Greek and Roman literature, and his taste was so good that Cicero used to send him his works for the benefit of his revision. None of his own writings have been preserved, but we have a series of 396 epistles addressed to him by Cicero in 68 to 44 B.C. His life by Nepos is a panegyric rather than a biography. See Boissier, *Cicero and his Friends* (trans. 1897).

Attila (Ger. *Etzel;* Hungarian, *Ethele*), the 'Scourge of God,' was born about 406, the son of Mundzuk, a chief of the Huns, and in 434 succeeded his uncle Rhuas as chief of countless hordes scattered from about the Caspian to the Danube. His brother Bleda shared with him the supremacy over the Huns, but was put to death about 444 by Attila, whom the Huns regarded with superstitious reverence, and Christendom with superstitious dread. Men believed that he was armed with the sword of the Scythian war-god, which must win dominion over the whole world. It is not certain when the name 'Scourge of God' was first applied to Attila; but he is said to have received it from a hermit in Gaul. The whole race of Huns was regarded in the same light. In an inscription at Aquileia, written a short time before the siege in 452, they are described as *imminentia peccatorum flagella* ('the threatening scourges of sinners'). The Vandals, Ostrogoths, Gepidæ, and many of the Franks, fought under Attila's banner, and in a short time his dominion extended over the people of Germany

and Scythia—from the Rhine to the frontiers of China. In 447, after an unsuccessful campaign in Persia and Armenia, he advanced through Illyria, and devastated all the countries between the Black Sea and the Mediterranean. Those inhabitants who were not destroyed were compelled to follow in his train. The Emperor Theodosius collected an army to oppose the barbarians' inrush, but in three bloody engagements fortune declared against him. Constantinople owed its safety solely to its fortifications and the ignorance of the enemy in the art of besieging; but Thrace, Macedon, and Greece were overrun; seventy flourishing cities were desolated; and Theodosius was compelled to cede a portion of territory south of the Danube, and to pay tribute to the conqueror, after treacherously attempting to murder him. In 451 Attila turned his course westward, and invaded Gaul, but here was boldly confronted by Aëtius, leader of the Romans, and Theodoric, king of the Visigoths, who compelled him to raise the siege of Orleans. He then retired to Champagne, and in the wide plain of the Marne —called anciently the Catalaunian Plain—waited to meet the enemy. The army of the West, under Aëtius and Theodoric, encountered the forces of the Huns near the site now occupied by the city of Châlons-sur-Marne. Both armies strove to obtain the hill of moderate height which rises near Mury, and commands the field of battle, and after a terrible contest, the ranks of the Romans and their allies, the Visigoths, were broken. Attila now regarded victory as certain, when the Gothic prince, Thorismund, immediately after his father had fallen, assumed the command, and led on the brave Goths, who were burning to avenge the death of Theodoric. Their charge from the height into the plain was irresistible. On every side the Huns were routed, and Attila with difficulty escaped into his encampment. This, if old historians are to be trusted, must have been the bloodiest battle ever fought in Europe; for it is stated by contemporaries, that not less than 252,000 slain were left on the field—a field, says tradition, yet haunted by their spectres. Attila, retiring within his camp of wagons, collected all the wooden shields, saddles, and other baggage into a vast funeral pyre, resolved to perish in the flames rather than yield; but by the advice of Aëtius, the Roman general, the Huns were allowed to retreat without much further loss, though they were pursued by the Franks as far as the Rhine. In the following year Attila had recovered his strength, and made an incursion into Italy, devastating Aquileia, Milan, Padua, and other cities, and driving the terrified inhabitants into the Alps, the Apennines, and the lagoons of the Adriatic, where they founded the city of Venice. The Roman emperor was helpless, and Rome itself was saved from destruction only by the personal mediation of Pope Leo I., who visited the dread barbarian, and is said to have subdued his ferocity into awe by the apostolic majesty of his mien. This deliverance was regarded as a miracle by the affrighted Romans, and old chroniclers relate that the apostles Peter and Paul appeared in Attila's camp, and changed his purpose. By 453, however, he seems to have forgotten their visit, for he made preparations for another invasion of Italy; but he died on the night of his marriage with the beautiful Ildiko, or Hilda, perhaps by her hand, more probably of hemorrhage. His death spread consternation through the host of the Huns. They cut themselves with knives, and shaved their heads, and then prepared to celebrate the funeral rites of their king. It is said that his body was placed in three coffins—the first of gold, the second of silver, and the third of iron; that the caparisons of his horses, with his arms and ornaments, were buried with him; and that the captives employed to make his grave were all put to death, that none might betray the resting-place of Attila. See HUNS; E. Hutton, *Attila and the Huns* (1915); also Gibbon, and Thierry's *Attila* (6th ed. 1876).

Attis, or ATYS, a nature deity of Lydia and Phrygia, associated in worship with Cybele, originally a shepherd beloved by the goddess. The myth includes his self-emasculation and his being transformed into a fir-tree. See HITTITES (*Trade and Religion*), and Frazer's *Attis, Adonis, Osiris.*

Attleboro, a manufacturing city in Massachusetts, 32 miles SW. of Boston; pop. 20,000. —North Attleborough is a separate town, with its own spelling of the name; pop. 9200.

Attleborough, an old market-town of Norfolk, 15 miles SW. of Norwich; pop. 2500.

Attock, a town and fort of the Punjab, on the left or east bank of the Indus. Attock stands below the fort, a parallelogram of 800 yards by 400, established by the Emperor Akbar in 1581, to defend the passage of the river, but it is no longer a position of strength. The road and railway bridge across the Indus here was opened in 1883. It has five arches 130 feet high, and renders continuous the railway connection between Calcutta and Peshawur (1600 miles). The situation of Attock is important, whether in a commercial or in a military view. It is at the head of the steamboat navigation of the Indus, being 940 miles from its mouth; while, about 2 miles above it, the Cabul River, the only considerable affluent of the Indus from the west, is practicable for vessels of 40 or 50 tons for a distance of 50 miles. The valley, again, of this last-mentioned stream, presenting, as it does, the best approach to the east and south from Central Asia, has been the route of nearly all but the maritime invaders of India from the days of Alexander the Great downwards. *Taxila*, where the Macedonians crossed the Indus, has been identified with Attock.

Attorney ('one appointed,' from the old verb *attorn*, 'turn, assign, or appoint'), a term of English law, used in a general sense to describe any person authorised to act on behalf of another, as, for example, the holder of a power or letter of attorney authorising him to sell property or do some other act on behalf of the grantor. 'Attorney-at-law' was formerly the proper style of those members of the legal profession who represented litigants in the courts of common law, and retained counsel on their behalf; but since the Judicature Act, 1873, it has been superseded by the designation of Solicitor (q.v.).

In the United States, the term attorney-at-law is used for one standing in the place of another in matters of law, including in itself the special offices designated in English and Scots law by the terms advocate, attorney, barrister, counsellor-at-law, lawyer, proctor, and solicitor, although all these terms, except barrister, are sometimes used as applicable to the attorney-at-law in the performance of the duties pertaining to his office.

The attorney-at-law is not a governmental officer, but is an officer of the court, responsible to the court under whose immediate supervision he is, for the faithful performance of his duties. He has property in his office, and although he may be punished summarily for official misconduct occurring in open court, he cannot be removed from his office without special cause and without having an opportunity to be heard by himself or counsel.

Empowered to stand in the place of his client in all matters of law, he performs all acts necessary for the successful prosecution or defence of his suit, not only in the office preparation of the cause, but also in arguing the same in open court.

Each state prescribes by statute the qualifications of its own attorneys, but generally a pre-

liminary examination as to educational qualifications is required, followed by a clerkship of from two to four years in the office of a regular practising attorney of known ability, whose duty it is to register the name as a student-at-law in the office of the prothonotary of the county; after this comes an examination as to legal attainments by a board of examiners appointed by the court, or graduation as Bachelor of Laws at a law college or university. A good moral character is always demanded.

Any person who has been admitted to the highest court of a state is eligible for admission to the district and circuit courts of the United States for that state, but to be admitted to the Supreme Court of the United States, it is necessary that an attorney shall have for three years been a practitioner in the Supreme Court of the state to which he belongs, and that his private and professional character shall be fair. His oath of office requires him to support the constitutions of his state and of the United States, and to behave himself with all fidelity to the court and to the client—hence citizenship of the United States and of the state are requisite.

The efforts of women to be admitted as attorneys-at-law in the state courts since 1870, and the refusal of the Supreme Court of the United States to admit women as attorneys, resulted in the enactment by congress, in 1879, of the following statute: 'Any woman who shall have been a member of the bar of the highest court of any state or territory, or of the Supreme Court of the District of Columbia for the space of three years, and shall have maintained a good standing before such court, and who shall be a person of good moral character, shall on motion and the production of such record, be admitted to practise before the Supreme Court of the United States.' Under this act, several women who have complied with its provisions have been admitted to practise as attorneys-at-law in the Supreme Court of the United States, but some of the states do not yet admit women to practise as attorneys. In 1887 about one hundred women, married or single, had been admitted as attorneys in the United States.

An attorney's warrant of attorney must be commensurate with the work to be done. The fiduciary relation between attorney and client cannot be delegated. In case of his death, service of papers cannot be made upon his law partner or executor, neither can he withdraw from the case without leave of the court. If removed by his client, which in most cases must be done by leave of court, he has a lien upon the papers in the cause for his fee.

An attorney-at-law is required to act with the utmost diligence and fidelity to his client, but his undertaking is not that he possesses perfect legal knowledge or the highest degree of skill in relation to the business he undertakes, but that he possesses the ordinary legal knowledge and skill common to members of the profession, and that in the discharge of his duties he will exercise ordinary and reasonable diligence, care, and prudence; he is therefore liable to his client for negligence by which damage is sustained. An attorney is trustee for his client for money collected, and after demand has been made upon him, he may be sued without notice. His authority to compromise a suit must be given him by his client. His confidential communications with his client are privileged, and are not to be revealed even on the witness stand.

Attorney-general, the title by which, in England and Ireland, the first ministerial law officer of the crown is known. The attorney-general is appointed by letters-patent. His office, powers, and duties correspond in many respects to those that belong to the Lord Advocate (q.v.) in Scotland, though the powers of the latter functionary are more extensive and less clearly defined. Originally, the attorney-general was simply the king's attorney, and stood to the sovereign in the same relation as any other attorney does to his employer. The term 'general' was afterwards conferred to distinguish him from attorneys appointed to represent the interests of the crown in particular courts, such as the Court of Wards; or from the master of the crown office, who is called the 'Coroner and Attorney for the King.' The early history of this office is involved in obscurity. Though there can be no doubt that the crown must always have been represented by an attorney in the courts of justice, the first record of the designation *Attornatus Regis* belongs to the reign of Edward I. (1272–1307). Up to a period comparatively recent, the king's serjeant was the chief executive officer of the crown in criminal proceedings, and this circumstance gave rise to various questions of difficulty as to the right to precedency of these officers respectively. These questions were set at rest in 1811 by a special warrant of the then Prince Regent, afterwards George IV., by which it was declared that both the attorney and solicitor general should have place and audience before all other members of the English bar. A similar question arose in a Scottish appeal in the House of Lords in 1835, between the Attorney-general and Lord Advocate, which was also decided in favour of the former. The following may be enumerated as the principal duties of the attorney-general: 1st, To exhibit informations and conduct prosecutions for crimes which have a tendency to disturb the peace of the state or endanger the constitution (see PLEA); 2d, To advise the government on legal questions; 3d, To conduct prosecutions and suits relating to the revenue; 4th, To file informations in the Exchequer for personal wrongs committed on any of the possessions of the crown; 5th, To protect charitable endowments in the sovereign's name, as *parens patriæ*, and, generally, to appear in all legal proceedings in which the interests of the crown are at stake. The attorney and solicitor-general were *ex officio*, till 1883, Commissioners of Patents (q.v.). The powers of the solicitor-general are co-ordinate with those of the attorney-general, and in the absence of the latter, or during a vacancy, the former may perform his functions in all their extent. Both usually have seats in the House of Commons, and their tenure of office concurs with that of the government of which they are members. They were formerly paid by fees, but now by fixed salary.

The duchies of Lancaster and Cornwall, and the county palatine of Durham, have separate attorney-generals.

Under the United States government, the attorney-general is one of the seven officials who constitute the president's cabinet. These officers are appointed by the president, confirmed by the senate, and removable at pleasure. The attorney-general is the head of the Department of Justice, and his duties are to give advice and opinions to the president, or any of the heads of the executive departments on questions of law arising in their respective departments. He argues suits in the United States courts when considered necessary, provides legal service on behalf of the government in the prosecution or defence of suits at law, examines titles to lands purchased by the United States for public use, and exercises a general superintendence over the minor officials of the United States courts. His salary is $8000 per annum. Nearly all of the states of the Union have attorney-generals, who are in some instances appointed by the governors, in others elected by the

people. Their duties under the state governments correspond essentially with those of the United States attorney-general under the general government.

Attraction. The mutual action between any two bodies is termed stress. When the stress tends to separate the bodies, or to prevent their mutual approach, it is termed a pressure or repulsion. When the stress is such that the bodies tend to approach each other, it is termed a tension or attraction. The words repulsion and attraction are used when the bodies are considered to influence each other directly; but when the action is considered to be propagated through an intervening medium, the terms pressure and tension are used. Newton believed that no action could be propagated except through a medium. Electric and magnetic phenomena have been very completely accounted for by the action of a medium (see ELECTRICITY). Attempts to explain gravitation by such action have not been so successful. Several discussions connecting gravitation with an electrical structure of matter, or with wave propagation through the æther, have been given recently. Kelvin showed that Cohesion (q.v.) can be explained by the Newtonian law of gravitational attraction. See GRAVITATION, CAPILLARITY, CHEMISTRY, MAGNETISM, RELATIVITY.

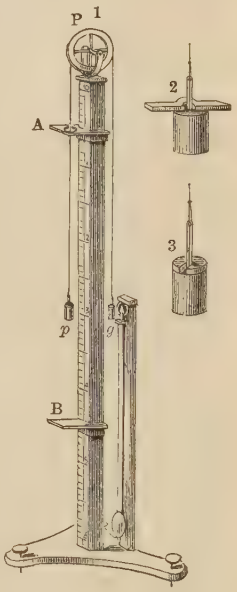
Attrek. See ATREK.

Attribute, in Logic, is used to denote the opposite of substance. The latter is considered to be self-existent, while the former can only be conceived as possessing a dependent existence. Attributes are commonly said to belong to substances. Thus, wisdom, holiness, goodness, and truth are termed attributes of God, who is himself regarded as the substance in which they inhere; in the same way, whiteness is an attribute of snow.

Attwood, THOMAS, musician, was born in London in 1765, and during 1783–87 studied at Naples under Cinque and Latilla, at Vienna under Mozart. With some other appointments, he held that of organist of St Paul's from 1796 till his death, 24th March 1838. His works, more tuneful than nervous, include two coronation anthems, songs, glees, and pianoforte pieces.

Attys. See ATTIS, HITTITES, p. 725.

Atwood's Machine, an instrument for illustrating the relations of time, space, and velocity in the motion of a body falling under the action of gravity. It was invented by George Atwood or Attwood, a mathematician of some eminence, who was born in 1745, educated at Cambridge, became fellow and tutor of Trinity College in that university, published a few treatises on Mechanics and Engineering, and died in 1807. It is found that a body falling freely passes (roughly) through 16 feet in the first second, 64 feet in the first two seconds, 144 feet in the first three seconds, and so on. These spaces would require a machine of impracticable size to illustrate the relations just mentioned. Or, if a conveniently small machine were used, the times to be observed would be so short that they could not be accurately measured by ordinary means. The object of Atwood's machine is to reduce the scale on which gravity acts without in any way altering the nature of its actions. The machine consists essentially of a pulley, P (see fig. 1), moving on its axis with very little friction, with a fine silk cord passing over it, sustaining two equal cylindrical weights, p and g, at its extremities. The pulley rests on a square wooden pillar, graduated on one side in feet and inches, which can be placed in a vertical position by the levelling-screws of the sole on which it stands. Two stages, A and B, slide along the pillar, and can be fixed at any part of it by means of fixing-screws. One of these stages, A, has a circular hole cut into it, so as to allow the cylinder, p, to pass freely through it; the other is unbroken, and intercepts the passage of the weight. A series of smaller weights, partly bar-shaped, partly circular, may be placed on the cylinders in the way represented in figs. 2 and 3. A pendulum usually accompanies the machine, to beat seconds of time. The weights of the cylinders, p and g, being equal, they have no tendency to rise or fall. When a bar is placed on p, the motion that ensues is due only to the action of gravity upon it, so that the motion of the whole must be proportionately slower than when all is falling freely. Suppose, for instance, that p and g are each $7\frac{1}{2}$ ounces, and that the bar is 1 ounce, the force acting on the system—leaving the friction and inertia of the pulley out of account—would be $\frac{1}{16}$ of gravity, or the whole would move only 1 foot in the first second, instead of 16. By a proper adjustment of weights, the rate of motion may be made as small as we please. The various formulæ (see KINEMATICS) connecting time, speed, and space fallen through under gravity can be experimentally verified by such an instrument. For example, if the weight of p be increased by a small amount, and the space it falls through in one second be noted, it is found that after two seconds it has fallen through four times that space, and so on. Thus, the space fallen through from rest is proportional to the square of the time occupied in falling. In practice this law would not be directly verified. Allowance has to be made for the inertia of the pulley, which is also driven by the weight of the bar, and for the effect of friction.



Atwood's Machine.

Aubagne, a town in the French department of Bouches-du-Rhône, on the river Huveaune, $10\frac{1}{2}$ miles E. of Marseilles by rail. The *Albania* of the Celtic Albici, it has a ruined castle, and a monument (1828) to the Abbé Barthélemy; it has potteries, and trades in fruit and wine. Pop. 6000.

Aube, a department in the north-east of France, occupying the southern part of the old province of Champagne and a small portion of Burgundy, bounded by Marne, Haute-Marne, Yonne, and Seine-et-Marne. The eastern part belongs to the basin of the river Aube; the western to that of the Seine. Area, 2300 sq. m.; pop. (1926) 238,253. The climate is moist but healthy. A great portion of the area is arable land. The north-east is chiefly pastoral; but the south-east is far more fertile, rich in meadow-land and forest, and producing grain, hemp, rape, hay, timber, and wine. The minerals are iron, building-stone, marble, chalk, marl, and potters' clay. Many persons are employed in the iron-industry, in cotton-spinning and weaving, in silk-spinning, and in the production of cloth, porcelain, faience, glass, paper, soap, and rape-sugar. There is an active commerce in wine, timber, and country produce by the railways, with which the department is covered, and of which its capital,

Troyes, is the centre. The river Aube rises near Mount Saule, on the plateau of Langres, and flows 140 miles north-westward by La Ferté, Bar, and Acris, to the Seine.

Aubenas, a town of SE. France, in the department of Ardèche, 50 miles NNE. of Alais by rail. It is built on a height rising 688 feet above the river Ardèche, and has a fine old castle, with some good 16th century houses. The inhabitants are employed in mining, tanning, paper-making; and the town is a great silk emporium. Pop. 4700.

Auber, Daniel François Esprit, composer of operas, was born at Caen in Normandy, 29th January 1782. His father, who was a printseller in Paris, sent him to London to acquire a knowledge of business. But his irresistible passion for music obtained the upperhand, and after a short stay he returned to Paris. Among his earliest compositions may be noticed his concertos for the violoncello. He now devoted himself to a deeper study of music under Cherubini, and wrote a mass for four voices. His next work, the opera *Le Séjour Militaire* (1813), was coldly received; but the death of his father compelled him to depend on his profession. In 1819 appeared *Le Testament et les Billets-doux*, which was also unsuccessful; but in *La Bergère Châtelaine* (1820) he laid the foundation of his subsequent fame. Though somewhat influenced by Rossini, his work has always a distinctive character. In 1822 he became associated with Scribe, who provided him subsequently with librettos admirably adapted to his music. Most of Auber's operas correspond to Scribe's comedies of Parisian life. Instead of deep natural feelings, they reflect elegant and brilliant French manners and conversation; the music is melodious, graceful, entertaining, but for the most part deficient in depth of thought and feeling. The most notable of his operas (nearly 50 in all) are *La Muette de Portici*, usually known as *Masaniello* (1828), *Fra Diavolo* (1829), *Le Domino Noir* (1837), *Les Diamants de la Couronne* (1841), *Haydée* (1847), *La Fiancée du Roi de Garbe* (1864), and *Rêves d' Amour* (1869). He was a member of the Institute, director of the Conservatory of Music, and commander of the Legion of Honour. He died at Paris, 13th May 1871. See Study by Malherbe (1911).

Aubergine. See Egg-plant.

Aubervilliers, one of the northern suburbs of Paris, with manufactures of rubber, perfumes, beer, glass, and chemicals. Its fort used to be important for the defence of Paris. Pop. 41,000.

Aubignac, François Hedelin, Abbé d' (1604–76), French author, born at Paris, wrote four tragedies, and published an important *Pratique du théâtre* (1657) at the instance of Richelieu.

Aubigné. See D'Aubigné.

Aubrey, John, antiquary and folklorist, was born at Easton Percy, near Chippenham, in Wiltshire, 12th March 1626, and was educated at Malmesbury, under Latimer, Hobbes's preceptor, at Blandford grammar-school, and at Trinity College, Oxford. He entered the Middle Temple in 1646, but was never called to the bar; in 1652 he succeeded to estates in Wiltshire, Herefordshire, and Wales, but was forced through lawsuits to part with the last of them in 1670, and with his books in 1677. His last years were passed, in 'danger of arrests,' with Hobbes, Ashmole, and other protectors, till in June 1697 he died at Oxford, on his way back from London to Draycott. His quaint, credulous *Miscellanies* (1696) was the only work printed in his lifetime; but he left a large mass of materials. Of these, his Wiltshire and Surrey collections have in part been published; his 'Minutes of Lives' (Hobbes, Milton, Bacon, &c.), given to Antony à Wood, first appeared in 1813 (new ed. by A. Clark in 1898); and his *Remains of Gentilism and Judaism* was issued by the Folklore Society in 1880.

Aubrietia, a genus of small purple-flowered Cruciferæ, natives of the mountains of Greece, Italy, &c., grown in rock-gardens. They resemble rock-cress (Arabis) in habit.

Auburn, the name of several places in the United States. (1) The most important of these is in the state of New York, 173 miles W. by N. of Albany. The outlet of Owasco Lake flows through the town, furnishing a water-power which is employed in mills of various kinds, and in manufactures of agricultural machinery on a large scale, wool, cotton, silk, carpets, iron, boots, shoes, flour, and paper. Since 1823 the state prison has been conducted on the 'silent' or 'Auburn' system. Pop. (1870) 17,225; (1880) 21,924; (1920) 36,192. —(2) A city of Maine, on the west bank of the Androscoggin River, by which it is separated from Lewiston, 35 miles N. of Portland by rail. It has manufactures of cotton, furniture, and boots and shoes. Pop. 17,000.

Aubusson, a town in the French department of Creuse, in the rocky gorge of the Creuse, 47 miles ENE. of Limoges, with famous carpet and tapestry works. Pierre d'Aubusson and Jules Sandeau were natives. Pop. 6000.

Aubusson, Pierre d'. See D'Aubusson.

Aucassin, hero of a 12th century French romance which records the love of Aucassin, son of the Count of Beaucaire, for Nicolette, the captive daughter of the king of Carthage. It has been often translated, as by Bourdillon (1887), A. Lang, Gibb, Henry and Thomson, Laurence Housman.

Auch, the capital of the French department of Gers, on the river Gers, 44 miles S. of Agen by rail. The *Augusta Auscorum* of the Romans, and the ancient capital of Gascony, it is built on a hill, whose summit is crowned by the splendid late-Gothic cathedral (1489–1662), rich in stained glass and carved woodwork. A flight of 200 steps leads up to it from the river. The chief articles of trade are woollen and cotten stuffs, fruits, sparkling wine, and the brandy of Armagnac. Pop. 9000.

Auchenia. See Llama.

Auchinleck, an Ayrshire town, 15 miles E. of Ayr by rail; population, 2500. The parish contains Auchinleck House (locally called 'Place Affleck'), the seat of the Boswell family. Here, beside this mansion, Sir Alexander Boswell, son of Johnson's biographer, established in 1815 the *Auchinleck Press*, for printing MSS. and rare works, such as the Romance of Sir Tristrem, the Disputation between John Knox and the Abbot of Crossraguel, &c. See Boswell.

Auchterarder, a Perthshire town, 14½ miles SW. of Perth by rail; population, 2300, largely employed in the woollen manufacture. Gleneagles golf-course is close by. Popular opposition to the presentee to the church of Auchterarder originated (1834) the struggle which ended in the formation of the Free Church in 1843.

Auckland, the northern provincial district of New Zealand, includes fully a half of North Island, and is about 400 miles long by 200 wide at its greatest breadth. The bays of its coast-line afford safe harbourage, and its rivers serve as highways for the produce of the interior. There are three almost natural divisions of this district: North Peninsula, East Coast, and the Waikato Country—the latter two, which had been mainly in the hands of the natives, have lately been opened up for European settlement. The land

is chiefly of two kinds—a light volcanic loam, and a stiff yellow clay. For the most part it is broken, with low ranges of hills and broad shallow valleys, covered to a great extent with dense forests, of which great areas have been cleared. It is more suited for grazing than for agricultural purposes. Gold, copper, tin, iron, coal, and other minerals exist in Auckland, which is also very rich in timber, the most important tree being the Kauri pine. The fossil gum of ancient forests of this pine is dug up in large quantities, and exported. Much New Zealand flax is grown and manufactured. The forests, of which over 3,500,000 acres still exist, are being utilised for timber; many sawmills are engaged in the industry. Dairying is an industry yearly increasing in importance, factories and creameries employing a large number of hands. Fruit canning and preserving, fisheries, the manufacture of Portland cement, paper-making, and many other industries are also steadily progressing. The exports include wool, Kauri gum, timber, flax, and gold. The climate is pleasant and healthy, and owing to sea-breezes the summer heat is not so great as in other parts of Australasia in the same latitude. Extensive areas of state lands have been set aside as reserves for the sake of their scenery and for the preservation of the Kauri pine. The township of Rotorua, on the shores of Rotorua Lake, 171 miles by rail from Auckland, is the centre of the famous hot-lake district, with its hot springs, cisterns of hot water, and mud geysers. There are valuable springs of acid and alkaline sulphurous waters at Rotorua, Lake Taupo, and elsewhere, which are much frequented both for drinking and bathing. The wonderful pink and white terraces near Tarawera Lake were destroyed by a volcanic eruption in 1886. The white terrace, which had the appearance of a crystal staircase, glittering and stainless, as of ice, was produced by deposits of silica from the boiling springs; the pink terrace, its companion, was flushed with a pale rose colour, believed to have been caused by the presence of oxide of iron. Auckland was the scene of the labours of Bishops Selwyn and Patteson. The population in 1875 was 79,104; (1881) 99,451; (1901) 175,860; (1921) 369,618 (excluding Maoris).

Auckland, the largest city in the North Island of New Zealand, situated on a peninsula about 7 miles wide on the Hauraki Gulf. It stands on the south side of Waitemata Harbour, one of the finest harbours in New Zealand, with sufficient depth of water for the largest steamers afloat; and its splendid wharves and graving-docks offer the most complete facilities for shipping. Auckland is distant from Sydney 1315 miles; from Melbourne, 1650; and has regular steam communication with both. It possesses also a harbour on the western side of the island in Manukau, only six miles across. It is surrounded by numerous thriving villages, with several of which it is connected by railway. Auckland contains a well laid out botanical garden and public parks, and shows numerous public buildings, government house, exchange, post-office, custom-house, banks, hotels, churches, and barracks. Most of the stores and shops are of a substantial character. It has a university college and Anglican and Roman Catholic cathedrals, museums, an academy of music, and a Free Library and Art Gallery. The temperature is singularly equable and free from extremes of heat and cold: the mean average temperature in shade is 59·6° F. The industrial establishments include brick, pottery, cement, and glass works, sawmills, shipbuilding yards, and meat-preserving works; sugar refinery, boot factory, &c. Auckland has connection with all the chief centres of New Zealand by telegraph. Pop. (1881) 16,675; but including suburban districts, 30,952; (1921), with suburbs, 157,757. The city was founded in 1840, and was named in honour of Lord Auckland, then governor-general of India. It was the capital of New Zealand up to 1865.

Auckland. See BISHOP-AUCKLAND.

Auckland, WILLIAM EDEN, LORD, statesman and diplomatist, third son of Sir Robert Eden, Bart., of West Auckland, Durham, was born in 1744, educated at Eton and Oxford, and called to the bar in 1768. In 1772 he was appointed Under-secretary of State, and afterwards filled the offices of Lord of Trade, commissioner to treat with the American insurgents, chief secretary to the Irish viceroy, minister-plenipotentiary to France (concluding a commercial treaty with that country, 1786), ambassador to Spain, ambassador to Holland, and postmaster-general. In 1788 he was raised to the Irish, in 1793 to the British, peerage as Baron Auckland. He died May 28, 1814. Besides *Principles of the Penal Law* (1771), we have his *Journal and Correspondence* (4 vols. 1860–62). —His son, GEORGE EDEN, EARL OF AUCKLAND, was born in 1784, and in 1814 succeeded as Lord Auckland. A steadfast supporter of Reform, he held two or three offices, and in 1835 was appointed governor-general of India. As such, in 1838, he plunged into the unhappy Afghan war, whose successful beginning procured him his earldom. Superseded in 1841, he returned to England, and died Jan. 1, 1849. See Life by Trotter (1895).

Auckland Islands, a group of islands about 290 miles to the south of New Zealand. The largest of them measures 27 miles by 15. It has two good harbours, and is covered with the richest vegetation. The Auckland Islands are valuable chiefly as a whaling station, but are not peopled. They form part of the Dominion of New Zealand.

Auction (Lat. *auctio*). The character of this convenient mode of offering property for sale is correctly indicated by the name, which means an arrangement for increasing the price by exciting competition amongst purchasers. In the *Dutch Auction* of the 'Cheap Jack,' the usual mode of proceeding is reversed, the property being offered at a higher price than that which the seller is willing to accept, and gradually lowered till a purchaser is found. The Scottish *roup* differs from the ordinary auction in having a judge of roup, and in sales of land an 'upset' price. In sales for redemption of land-tax in England, the bidding is often for the smallest quantity of land to be taken for a fixed sum. 'Conditions of Sale,' or 'Articles of Roup,' as they are called in Scotland, constitute the terms on which the seller offers his property, and form an integral part of the contract between seller and purchaser. The contract is completed by the offer or bid on the part of the purchaser, and the acceptance by the seller or his representative, which is formally declared by the fall of the auctioneer's or salesman's hammer, the running of a sandglass, the burning of an inch of candle (hence the term 'sale by the candle'), or any other means which may have been specified in the conditions of sale. Mere advertisement does not make a contract. These conditions or articles ought further to narrate honestly and fully the character of the object or the nature of the right to be transferred, to regulate the manner of bidding, prescribe the order in which offerers are to be preferred, and to name a person who shall be empowered to determine disputes between bidders, and in cases of doubt to declare which is the purchaser. Before the sale commences, these conditions, which are executed on stamped paper, are read over, or otherwise intimated to intending purchasers, but it is sufficient if they are posted up in the auction room. The conditions, thus published,

cannot be controlled by any verbal declaration by the auctioneer. Even the statements in a catalogue, or particulars of an estate, cannot be varied by statements of auctioneer. It is understood that an auctioneer may puff his goods. The implied conditions, which, in addition to those thus expressed, are binding on the seller and purchaser in all auctions, are: (1) That the seller shall not attempt to raise the price by means of fictitious offers, but shall fairly expose his goods to the competition of purchasers; and (2) That the purchasers shall not combine to suppress competition. It is usual to stipulate for a deposit varying from 5 to 25 per cent. by the purchaser, either with the auctioneer or (in sales of land) with the seller's solicitor. Much doubt has arisen as to the lawfulness of biddings for the exposer, through the auctioneer or by others. The exposer may set a price below which the thing is not to be sold, which is best and most openly done by fixing an upset price, or he may expressly reserve to himself a power to offer. The Sale of Goods Act, which is applicable to both England and Scotland, provides (sec. 58) that when a sale by auction is not notified to be subject to a right to bid on behalf of the seller, it is unlawful for the seller to bid himself, or to employ another to bid, or for the auctioneer knowingly to take any bid from the seller or a person employed by him to bid. Any sale contravening this rule may be treated as fraudulent by the buyer. Where an unlawful offer is made for seller, the remedy is to set aside this, and the contract holds with the last *bona fide* offerer. Nearly all sales by order of court take place by auction, and the same course is directed by numerous statutes, as the Pawnbrokers Act, the Summary Jurisdiction Act with regard to distresses, &c. See also BRIDGE.

Auctioneer, the person who conducts an Auction (q.v.). The auctioneer is in a certain sense the agent both of seller and purchaser, and by the fall of his hammer, or by writing the purchaser's name in his book, he binds him to accept the article sold at the price indicated. The auctioneer may also, and frequently does, act as agent for absent purchasers, or for persons who have instructed him to make biddings for them during the sale. In both cases, however, the purchaser must be *bonâ fide*, otherwise the auctioneer would himself become a 'puffer.' As to the circumstances in which he may bid for the seller, see AUCTION. Where the auctioneer declines or omits to disclose the seller's name, he undertakes the responsibilities of the latter to the purchasers. To the seller, again, he is responsible for ordinary skill, assiduity, and prudence. Every auctioneer pays an annual duty of £10 to government for his license, which must be renewed on the 5th July; though there are certain judicial sales which may be conducted by bailiffs without license. But the want of a license does not vitiate the sale. An additional license is required for the sale of excisable goods, but the ordinary license entitles an auctioneer to act also as appraiser. An auctioneer is generally paid by commission on proceeds after deduction of expenses, and this is due even where the owner makes a private sale after an unsuccessful exposure; for this commission the auctioneer has a lien upon the price and goods in his hands. The auctioneer is liable for negligence in the custody of goods sent to him for sale, but he is not liable for the price unless he has received it.

Au'cuba, a genus of Cornaceæ (q.v.), of which the familiar species is *A. japonica*, an evergreen shrub resembling a laurel, but, as seen in Europe, usually with pale green leaves curiously mottled with yellow. It is dicœcious, and for long the female plant was alone in cultivation in Europe. The male, and also the normal green-leaved forms, have been introduced, and many varieties are now grown. The scarlet berries are therefore more frequently seen now that pollination is possible. It has long been largely cultivated as a hardy

Aucuba japonica.

ornamental shrub, especially in the suburbs of large towns, a situation for which it is well adapted, as it is little liable to suffer injury from smoke. It is often known as the variegated or Japan laurel, but has of course no affinity with any of the other plants popularly confused under that name. *A. chinensis* is from SW. China; *A. himalaica* from Sikkim and Dárjiling.

Aude (*Atax*), a river in the south of France, rises in the Pyrenees, not far from Mont Louis; flows for some time parallel to the canal of Languedoc; and falls into the Mediterranean 6 miles ENE. of Narbonne, after a course of 130 miles.

Aude, a maritime department in the south of France. It comprises some old 'counties' which formerly constituted a portion of the province of Languedoc. Area, 2448 sq. m.; pop. (1926) 291,951. The southern part is occupied by spurs of the Pyrenees, attaining 4037 feet in the Pay de Bugarach; but the greater portion belongs to the valley of the lower Aude, and is bounded to the north by offsets of the Cevennes (4018 feet). The coast is flat, with no bays or roadsteads, but several lagoons. The climate is warm, but variable. The mountains are composed of granite, while the soil of the plains is chiefly calcareous, and about the coast—where salt and soda are procured—is extremely fertile, producing cereals, olives, fruits, and wines. Aude is rich in iron and mineral springs, but the coal-mines have been generally abandoned. Wild animals are found, and game of all sorts is plentiful, while the coast abounds in fish. The woollen and silk manufactures are of considerable value. There is likewise a considerable export of cereals and of honey. The chief town is Carcassonne (q.v.).

Audebert, JEAN BAPTISTE, a French naturalist and artist, was born in 1759 at Rochefort, and at Paris attained eminence as a miniature-painter. In 1800 he published a splendid illustrated volume on the monkeys and lemurs, the *Histoire Naturelle des Singes*, a large folio, with coloured plates remarkable alike for their truth and beauty, and in whose production he introduced great improvements in the art of colour-printing in oil. He subsequently prepared a similar work on the

humming-birds (1802), and another on the birds of paradise (1803), which were both completed and published after his death in 1800.

Audh. See OUDH.

Audiometer is a special application of the Telephone (q.v.) for measuring minute differences in the power of hearing.

Audiphone is the name of an invention (1879) by Mr Rhodes of Chicago, to assist the hearing of deaf persons in whom the auditory nerve is not entirely destroyed. The instrument is made of a thin sheet of ebonite rubber or hard vulcanite. It is about the size of a palm-leaf fan, with a handle and strings attached to bend it into a curving form, and a small clamp for fixing the string at the handles. The audiphone is pressed by the deaf person using it against his upper front teeth, with the convex side outwards; when so placed it communicates the vibrations caused by musical sounds or articulate speech to the teeth and bones of the skull, and thence to the organs of hearing. For different sounds, it requires to be focused to different degrees of convexity. A simple strip of fine glazed millboard has been recommended by some experimenters as a cheaper and equally serviceable audiphone; and birch-wood veneer has been used with success for the same purpose.

Audi'ta Quere'la is a form of action which lies for a defendant to recall or prevent an execution, who has grounds to show that such execution ought not to issue against him, or on account of some matter occurring after judgment amounting to a discharge, which could not have been and cannot be taken advantage of otherwise. It is a remedial process, equitable in its nature, based upon facts, and not upon the erroneous judgment or acts of the court, in which damages may be recovered if execution was improperly issued. In the United States, it has in some states been entirely superseded by relief granted upon motion, while in other states it is recognised by statute and of frequent use. The writ of Audita Querela does not lie against the government.

Auditor, the name given to those who are appointed to examine accounts on behalf either of the government, of courts of law, of corporations, or of private persons. An auditor is usually, but not always, a professional accountant. His duties are to see that all payments and receipts in the accounts submitted to him are instructed by vouchers, or otherwise proved, that the accounts and books are properly kept and stated, and either to certify their accuracy, or point out any error he may discover. All limited companies must have their accounts certified by an auditor appointed by the shareholders.

AUDITOR OF THE COURT, in Scotland, is an officer whose duties, like those of *taxing master* in England, consist of taxing the costs of suits in which expenses are found due, a remit being made to him for that purpose by the presiding judge.

AUDIT-OFFICE.—In 1785 public auditors were appointed under the title of 'Commissioners for Auditing the Public Accounts;' and the patents of the two auditors of the imprests of the Admiralty were vacated, the sum of £7000 per annum being made payable to each of them for life. Many subsequent statutes have been passed for the purpose of extending and defining the duties of these commissioners, and regulating the business of the audit-office. In 1866 an act was passed 'to consolidate the powers and duties of the comptroller of Her Majesty's Exchequer and of the Commissioners for Auditing the Public Accounts, and to unite in one department the separate establishments under them.' That department now consists of a comptroller and auditor-general, an assistant comptroller and auditor, and a large staff of clerks. The Audit Department is empowered to call on all keepers of public accounts to account for moneys or stores entrusted to them, and examine the accounts of Army and Navy, of Land Revenue and the like.

See ACCOUNTANT; Dicksee's *Auditing* (9th ed. 1912); Pixley's *Auditors and their Duties* (9th ed. 1906); *A History of Accounting and Accountants*, by R. Brown and others (1905).

Audley, SIR JAMES, one of the original knights of the Order of the Garter, founded in 1344 by Edward III., in 1350 fought in the sea-fight of Sluys, and in 1354 attended Edward the Black Prince to France. He showed such bravery at the battle of Poitiers that the Prince declared him to be the bravest knight on his side, and conferred on him an annual revenue of 500 marks, which Audley immediately gave up to his four squires. Hearing of this act of generosity, the Prince conferred on him a further pension of 600 marks. Audley, in 1362, was governor of Aquitaine; in 1369, great seneschal of Poitou. He took part in the capture of La-Roche-sur-Yon in the same year, and died a few months after at Fontenay-le-Comte.

Audouin, JEAN VICTOR, naturalist, was born at Paris, 27th April 1797, and studied medicine and the natural sciences. Installed in 1833 as professor of Entomology at the Jardin des Plantes, he made special studies on the muscardine (a silkworm disease), the parasites infesting the vine, and other insect pests. He wrote on these (1842) and on the natural history of the French coasts (1830), and died 9th November 1841.

Audran, EDMOND (1842–1901), born at Lyons, composed vaudevilles and comic operas, the best known being *Le Grand Mogol* (1876), *La Mascotte* (1880), *La Cigale* (1890), and *La Poupée* (1896).

Audran, GÉRARD, French engraver, was born at Lyons in 1640, and after three years at Rome, where he acquired a high reputation by his engraving of Pope Clement IX., was recalled to France by Colbert, and appointed engraver to Louis XIV. Here he engraved the works of Lebrun, illustrating the battles of Alexander, and many paintings by Raphael, Titian, Domenichino, Poussin, and others. He died at Paris in 1703. His nephews, Benoît (1661–1721) and Jean (1667–1756), were also engravers.

Audubon, JOHN JAMES, American ornithologist, is said to have been born on his father's plantation, near New Orleans, 5th May 1780, but was probably born a year of two earlier. His father had been an officer in the French navy. His mother was a lady of Spanish extraction, who, after the birth of four children, accompanied her husband to St Domingo, and there perished in the great negro insurrection. Visiting France with his children, the elder Audubon soon married again, settled his family in the city of Nantes, and resumed his duties in the French navy; and it was chiefly through his stepmother's indulgence that young Audubon was enabled to gratify his taste as a naturalist. His father undertook to educate him for the army or navy; but music, drawing, and the collection of natural history specimens usurped the attention that should have been given to mathematics, until finally the lad was sent to America to occupy a property in Eastern Pennsylvania, which his father had previously purchased. Here he lived for some time a sort of Bohemian naturalist, and here he married in 1808 Miss Lucy Bakewell, the daughter of a farmer. Immediately after, he sold his land, bought a stock of goods, and, with his

wife and a French friend and partner, Rosier, migrated westward to engage in mercantile pursuits. A flat-bottomed boat conveyed the party down the Ohio from Pittsburg to Louisville, Kentucky, where they commenced trade, Audubon, however, spending his time principally away on expeditions with the neighbouring planters hunting birds, while Rosier 'stuck to the counter.' Business so conducted naturally proved unprofitable, and the firm removed first to Hendersonville, Kentucky, and next to St Genevieve, Missouri, where Audubon sold his interest to his partner and returned to Hendersonville. A succession of business misadventures speedily swept away all his funds, when, with 'his sick wife and his gun, his dog, and his drawings,' he returned to Louisville, and engaged in drawing portraits, whereby (here and subsequently in Cincinnati) he supported his family for a while in comfort. In 1820, however, he left Cincinnati, without a dollar, on an excursion down the Ohio and Mississippi rivers, stopping at the principal towns and drawing portraits, and adding at every available opportunity to his already wonderful collection of coloured designs of birds. He records that in one instance he executed portraits of a shoemaker and his wife in payment for two pairs of boots, one of which he gave to a destitute fellow-traveller, reserving the other pair for his scarcely less destitute self. After a precarious existence of this sort for some three years, Audubon visited the cities of the Atlantic coast with the view of publishing his works; but meeting with little encouragement, he returned to Louisiana, and taught classes in dancing. Encouraged and assisted by his wife, who was receiving nearly $3000 a year as a teacher, he embarked for Europe in 1826, where he was received with great kindness by the leading scientists. Public exhibitions of his drawings in Liverpool and Edinburgh proved successful, and in 1827 he issued the prospectus of his great work, *The Birds of America*, to appear in numbers at two guineas each—each number to consist of five plates. He canvassed the British towns for subscribers, meanwhile painting and selling pictures to defray his current expenses, and in 1828 visited Paris, where his work received the highest encomiums—a report from Cuvier to the Paris Academy of Sciences declaring it 'the most magnificent monument which art has yet erected to nature.' The work embraces coloured figures of 1065 species of birds (natural size), the publication of which occupied some ten years, and is said to have cost £20,000 ($100,000). In the meantime, Audubon visited America, and explored the least known regions of the Atlantic coast from Labrador to the Gulf of Mexico, returning to London in 1837. In 1839 he settled in New York city, visited the Yellowstone River in 1843, and subsequently, assisted by his sons, he published *The Quadrupeds of North America*, largely from materials prepared some years prior by himself and Dr John Bachman. He died 27th January 1851.

See a Life by Mrs Horace St John (1856); that by R. Buchanan from materials supplied by his widow (1869); but especially *Audubon and his Journals*, by his daughter, Maria R. Audubon (2 vols. 1898); F. H. Herrick, *Audubon the Naturalist* (2 vols. 1917).

Auenbrugger von Auenbrug, Leopold, an Austrian physician, born at Gratz in 1722, practised at the Spanish hospital in Vienna, where he died in 1809. As early as 1754 he had discovered the method of investigating internal diseases which afterwards made him famous; but not until after seven years of experiments and verification did he publish his treatise, entitled *Inventum novum ex percussione thoracis humani interni pectoris morbos detegendi* (Vienna, 1761). See Percussion.

Auerbach, Berthold, German novelist, was born, of Jewish parentage, at Nordstetten, in the Württemberg Black Forest, 28th February 1812. He received his education at the Talmud school of Hechingen, at Carlsruhe, at Stuttgart gymnasium, and at the universities of Tübingen, Munich, and Heidelberg, in 1836 suffering several months' imprisonment in the fortress of Hohenasperg as a member of the students' Burschenschaft. He had been destined for the synagogue, but had early abandoned theology for law, then law for history and philosophy—the philosophy, above all, of the great thinker of his race, Spinoza. A biographical romance, based on Spinoza's life, succeeded in 1837 his earliest work, *Das Judentum und die neueste Litteratur* (1836), and itself was followed by a translation of Spinoza's works (5 vols. 1841). In the first series of his *Schwarzwälder Dorfgeschichten* (1843), on which his fame chiefly rests, he gives charming pictures of Black Forest life, though his peasants too often are peasant Spinozas. The longer stories—*Barfüssele* (1856), *Joseph im Schnee* (1861), and *Edelweiss* (1861)—are good, but not so good; and the three-volume didactic romances of the third and last period of his literary career, though clever of course, are tedious to a degree. These were *Auf der Höhe* (1865), *Das Landhaus am Rhein* (1869), *Waldfried* (1874), &c. —'philosophical novels, in which,' in his own words, he 'undertook to treat problems of speculative ethics, and dealt not so much with events and actual conflicts in life as with conversations and the unfolding of definite objects of thought.' Many of Auerbach's works, which in German fill nearly 40 volumes, have been translated, not over well, into English. After a restless life, passed at Frankfort, Vienna, Dresden, Berlin, &c., he died at Cannes, 8th February 1882. See books on him by Eduard Lasker (1882) and Bettelheim (1904), and two volumes of his Correspondence (1884).

Auersperg, Anton Alexander, Graf von, German poet, was born at Laibach, April 11, 1806. Descended from an ancient Swabian family which, in the 11th century, had settled and acquired large estates in Carniola, he took a prominent position in the diet of that province (1861–67). In 1861 he was chosen a life-member of the upper house of the Austrian Reichsrath; and he died at Gratz, 12th September 1876. He was always distinguished by his Liberalism and his ultra-German sympathies; but he is best known, under the *nom de guerre* of Anastasius Grün, as one of the German epic and lyrical poets, among whom he holds a high rank, excelling most in humorous subjects and political satires. His collected works fill 7 vols. (1877). See the Life of him by Radicz (2 vols. 1876–78).

Auerstädt, a village in the Prussian province of Saxony, 10 miles W. of Naumburg. It is famous for the great battle which took place there, October 14, 1806, between the French under Davoust, and the Prussian army under Duke Charles of Brunswick, which ended in a great victory for the former. The Prussians, who numbered fully 48,000, left nearly half their men, dead or wounded, on the ground, while the French (30,000) escaped with a loss of only 7000. Napoleon, who had, on the same day, defeated the main army of Frederick-William III. at Jena (q.v.), made Davoust Duke of Auerstädt.

Aufrecht, Theodor, philologist, born 7th January 1822 at Leschnitz in Upper Silesia. After studying at Berlin under Bopp, Böckh, and Lachmann, he settled there in 1850, and devoted himself to Sanskrit and the old German tongues. To this time of his life also belongs

his collaboration with Kirchhoff in the publication of *Umbrische Sprachdenkmäler* (2 vols. Berlin, 1849–51), an epoch-making work in the comparative study of the languages of ancient Italy; as well as the founding of the well-known *Zeitschrift für vergleichende Sprachforschung* (1852), in the editing of which he assisted A. Kuhn for some time. In 1852 he repaired to Oxford, where he helped Max Müller in his edition of the *Rigveda*, and was appointed to a place in the Bodleian Library, the fruit of which was his excellent *Catalogus codicum Sanscritorum bibliothecæ Bodleianæ Oxoniensis* (1864). In 1862 he became professor of Sanskrit and Comparative Philology at Edinburgh, and in 1875 resigned this chair for one at Bonn, which he resigned in 1889. He died in May 1907. We owe to him scholarly editions of several classical Sanskrit works, the most important his *Rigveda* (2nd ed. 1877).

Auge'as, or AUGEIAS, son of Phorbas or of Helios (the sun), king of the Epeans in Elis. He had 3000 head of oxen in his stables, which had not been cleaned out for thirty years. Hercules was commissioned by Eurystheus to cleanse the Augean stables in one day, and was promised as payment a tenth part of the oxen. He accomplished the task by turning the courses of the rivers Peneus and Alpheus through the stables. Augeas now refused to pay the stipulated wages, whereupon Hercules killed him.

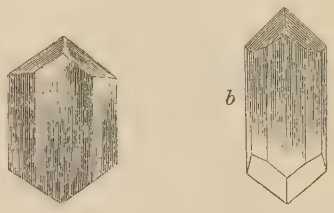
Augereau, PIERRE FRANÇOIS CHARLES, Duke of Castiglione, marshal and peer of France, one of the most brilliant and intrepid of that band of general officers whom Napoleon gathered around himself, was the son of a Paris fruiterer, and was born in 1757. After serving in the French and Neapolitan armies, he settled in Naples as a fencing-master in 1787. In 1792 he volunteered into the French revolutionary army, and in less than three years was made a general of division. In 1795 he accompanied the army to Italy, where he greatly distinguished himself, gaining glory in the battles of Lodi, Castiglione (in 1796, from which he afterwards received his title), and Roveredo. At Paris, in 1797, he carried through the *coup d'état* of the 4th September, and he soon became a supporter of Napoleon. In 1801 he received the command of the army in Holland. In 1804 he was made a marshal; commanded a wing at Jena and at Eylau; was governor at Berlin, and fought at Leipzig in 1813. He died in 1816.

Aughrim. See AGHRIM.

Augier, GUILLAUME VICTOR ÉMILE, a French dramatist, was born at Valence, September 17, 1820, and was educated as a lawyer. In 1844 he composed a drama in verse, *La Ciguë*, which was played at the Odéon with success. Other dramas in verse are *Gabrielle* (1849), *Diane* (1852), *La Jeunesse* (1858), and *Paul Forestier* (1868). Originally criticised as a leader of the 'school of good sense,' he ultimately dealt unsparingly with the vicious tendencies of modern life, though never forsaking the idealist standpoint. His later dramas are mostly in prose, and may be said to belong to the comedy of intrigue. Notable works are *Le Mariage d'Olympe* (1855); *Le Gendre de M. Poirier* (1854), written in partnership with Jules Sandeau; *Les Lionnes Pauvres* (1858); *Les Effrontés* (1861); *Le Fils de Giboyer* (1862); *Maître Guérin* (1869); *Les Fourchambault* (1874). In 1858 he became a member of the Academy, and in 1868 Commander of the Legion of Honour. He died 28th October 1889. His *Théâtre complet* fills 7 vols. (1876–90).

See monographs by Pailleron (1889), Parigot (1890), Morillot (1901), and H. Gaillard de Champris, *Émile Augier et la Comédie Sociale* (1910).

Augite (Gr. *augē*, 'brilliancy'), one of the Pyroxene group of minerals, is very nearly allied to Hornblende (q.v.). Augite consists of 47–56 per cent. of silica, 20–25 per cent. of lime, and 12–19 per cent. of magnesia, the magnesia sometimes giving place in whole or in part to protoxide of iron, and some varieties containing a little alumina, or a little protoxide of manganese. Its specific gravity is 3·195–3·525. It is little affected by acids, or not at all. It is usually of a greenish colour, often nearly black. It crystallises in six or eight-sided prisms, variously modified. It is an essential com-



a, Common Augite; *b*, Green Augite.

ponent of several igneous rocks, particularly of Basalt (q.v.) and its varieties, and it occurs as an accessory constituent in a great many more. It is, in fact, as a rock-constituent that augite derives its importance as a mineral species. It is rarely associated with quartz, in which respect it differs from hornblende, but very often with labradorite, olivine, nepheline, and leucite. Fluorine, which is generally present in small quantity in hornblende, has never been detected in augite. The form of the crystals is also different in the two minerals, as well as their cleavage. In augite the cleavage-planes intersect nearly at right angles; in hornblende the angles are 124° 30′ and 55° 30′. Rose of Berlin endeavoured to show that the difference between augite and hornblende arises only from the different circumstances in which crystallisation has taken place, and that augite is the production of a comparatively rapid, and hornblende of a comparatively slow, cooling. His views have been supported by experiments, and by a comparison of augite with certain crystalline substances occurring among the scoriæ of foundries.—*Diopside*, *Sahlite*, and *Coccolite* are varieties of augite.—*Diallage* (q.v.) and *Hypersthene* (q.v.) are very nearly allied to it.

Augium, the Latin name of Eu (q.v.).

Augment, in Indo-Germanic grammar, a vowel prefixed to the historic tenses in the indicative mood. It survived in Sanskrit as *a-*, and in Greek as *e-*, which contracted with a following vowel.

Augmentation, in Heraldry, an additional charge in a coat-of-arms bestowed by the sovereign as a mark of honour. Augmentations have generally been granted to be borne on a canton, on an escutcheon *en surtout*, or on a chief. The bearings on the chiefs of augmentation bestowed on the military and naval heroes of England in the beginning of the nineteenth century are for the most part so confused and unarmorial that an intelligible description of them can scarcely be given in heraldic language.

Augmentation, in Music, is the reproduction of a melody, or principal subject of a composition, in the course of the progress of the piece, in notes of greater length than those notes in which the melody is first introduced. The tempo remains unaltered. Augmentation is of great importance in the treatment of the subjects, or themes, for fugues, and when cleverly used produces great effects.

Augmentation, PROCESS OF, in Scots law, an

action in the Court of Teinds (q.v.) by the minister of a parish against the titular or person entitled to the free teinds, and the heritors, i.e. the landowners, for the purpose of procuring an increase to his stipend. The moderator and clerk of the presbytery to which the minister belongs must also be called as parties. A period of twenty years must elapse before the minister becomes entitled to a fresh augmentation. There must of course be some free teind in the parish—i.e. teind not previously applied to stipend—otherwise there can be no augmentation. In many parishes the teinds are exhausted. The amount of the augmentation is fixed, or modified, as it is termed, in so many chalders of grain or victual, generally Linlithgow measure of oatmeal and barley: the stipend itself being paid in money, according to the Fiars Prices (q.v.) of each year. In the modification of a suitable stipend, regard is had to the state of the teinds, the extent of the parish, the population to be cared for, the expense of living, and the like; but a general cause, such as the Repeal of the Corn Laws, was not held to justify an augmentation. This process has the further object in view of *localling* the stipend so modified —i.e. of assigning it in due proportions to the heritors or other parties in possession of the teinds. This object is attained by means of what is called a scheme of locality—an allotment of the stipend modified to the several parties liable therefor. This scheme is prepared at the instance of the second junior Lord Ordinary, on a remit from the Teind Court. The last conclusion in a summons of augmentation is for a suitable sum, or increase to the sum already allowed, for communion elements—i.e. for bread, wine, and other necessaries for celebrating the sacrament of the Lord's Supper after the Presbyterian fashion. When the population of a parish does not exceed 2000, the court will not allow more than £10 for communion elements; but in the case of large town parishes, greater sums are allowed. When there is not sufficient teind to bring the stipend up to £150, with £8, 6s. 8d. for communion elements, the deficiency was formerly paid by the Exchequer; but this fund is now exhausted. Much discontent is felt with the tedious and expensive nature of augmentations, especially where in an urban parish the stipend has to be allocated over a great number of small rentals. Litigation frequently occurs as to the rights held to teinds, and the validity of the valuations of teinds made early in the 17th century.

Augmentation of Benefices is an important form of church extension in England. Much of the Queen Anne's Bounty is applied to this purpose, and under the Lord Chancellor's Act of 1863 nearly a quarter of a million sterling, realised by the sale of certain classes of advowson, has been similarly applied. See Stipend, Glebe; also Parish, Queen Anne's Bounty.

Augsburg, an historic city of Bavaria, capital of the province of Swabia, is situated in the angle between the rivers Wertach and Lech, 37 miles WNW. of Munich. Augsburg has numerous fine Renaissance and Baroque buildings, and the Maximilianstrasse is adorned with three bronze fountains (1593–1602). The principal edifices are the Renaissance town-house (1620), with its splendid 'Golden Hall;' the Perlach Tower, dating from the 11th century; the former episcopal palace, where, on 25th June 1530, the Protestant princes presented the Augsburg Confession (q.v.) to Charles V.; the grand old Fugger mansion; the 'Three Moors,' one of the most interesting hostelries in Germany; the art gallery, with Holbeins and Burgkmairs; and the Gothicised Romanesque cathedral (994–1421), with its bronze doors and early glass-paintings. The old fortifications have been turned into promenades. The industry of Augsburg is once more vigorous. Cotton is now the staple manufacture; and there are also large factories for linens, woollens, paper, tobacco, and machinery, as well as foundries, breweries, dye-works, and chemical-works. The gold and silver wares retain their ancient reputation; and printing, lithography, and bookselling have taken a new start, though the well-known *Allgemeine Zeitung* (1798) was in 1882 transferred to Munich. Banking and stock-jobbing are extensively carried on; and Augsburg is still the emporium of the trade with Italy and southern Germany, being the centre of a system of railways that connect it with Nürnberg, Leipzig, Switzerland, Munich, &c. Pop. (1871) 51,270; (1925) 165,522, mostly Roman Catholics.

The foundation of Augsburg was the 'colony' planted by the Emperor Augustus, 12 B.C., after the conquest of the Vindelici, probably on the site of a former city of that people. It was called *Augusta Vindelicorum*, and hence the present name. It became the capital of the province of Rhætia, was laid waste by the Huns in the 5th century, and came next under the dominion of the Frankish kings. In the war of Charlemagne with Thassilo of Bavaria, it was again destroyed (788). After the division of Charlemagne's empire, it came under the Duke of Swabia; but having become already rich by commerce, was able to purchase gradually many privileges, and finally became in 1276 a free city of the empire. It now rose to greater consequence than ever, and had reached the summit of its prosperity by the latter half of the 14th century. In 1368 its aristocratic government was set aside for a democratic, which lasted till 1548, when the aristocracy, favoured by Charles V., regained the ascendency. Augsburg continued in great eminence for its commerce, manufactures, and art, till the war between Charles V. and the Protestant league of Schmalkald (1546). Along with Nürnberg it formed the emporium of the trade between Northern Europe and the south, and its merchants were princes whose ships were in all seas (see Fugger, Welser). It was also the centre of German art as represented by the Holbeins, Burgkmair, Altdorfer, and others. Many diets of the empire were held in Augsburg, and the leading events of the Reformation are associated with its name, as *the* Diet of Augsburg (1530), the Interim of Augsburg (1548), and the 'Religious Peace' of Augsburg (1555) by which the Protestants secured the full enjoyment of their rights and privileges (see Reformation). The discovery of the road to India by the Cape, and of America, turned the commerce of the world into new channels, and dried up the sources of Augsburg's prosperity. It ceased to be a free city on the abolition of the German empire, and was taken possession of by Bavaria in 1805.

Augsburg Confession, the chief standard of faith in the Lutheran Church. With a view to an amicable arrangement of the religious split that had existed in Germany since 1517, Charles V., as protector of the church, had convoked a diet of the empire, to meet at Augsburg, 8th April 1530, and had required from the Protestants a short statement of the doctrines in which they departed from the Catholic Church. In March, therefore, the Elector, John of Saxony, called on his Wittenberg theologians, with Luther at their head, to draw up articles of faith, to lay before him at Torgau. The commissioned doctors took as a basis, in so far as pure doctrine was concerned, articles that had been agreed to the previous year at conferences held at Marburg and Schwabach, in the form of resolutions of the Lutheran reformers of Germany against the doctrines of Zwingli. These doctrinal articles, supplemented, and with a practical part newly added, were laid before the

Elector at Torgau. Melanchthon then, taking as a foundation the Torgau articles, began at Augsburg in May, and, with the advice of various Protestant theologians, as well as princes and other secular authorities, composed the document which he first called an Apology, but which in the diet itself took the name of the Augsburg Confession. Luther was not present in Augsburg, being then under the ban of the empire, but his advice was had recourse to in its composition. The Torgau articles were in German; the Confession was both in German and Latin; and Melanchthon laboured incessantly at its improvement till it was presented to the emperor, June 25. In composing the document, Melanchthon sought to maintain a spirit of forbearance and conciliation, as well as to secure the utmost brevity and simplicity. The aim of the Confession was to give a collected view of the belief of the Lutheran Protestants, to lay a foundation for measures of reconciliation. The Protestant doctrines were stated in a form as near that of the Catholic views as possible, and their agreement with the church fathers carefully emphasised.

The first part of the Confession contains twenty-one articles of faith and doctrine: 1. Of God; 2. Of Original Sin; 3. Of the Son of God; 4. Of Justification; 5. Of Preaching; 6. Of New Obedience; 7 and 8. Of the Church; 9. Of Baptism; 10. Of the Lord's Supper; 11. Of Confession; 12. Of Penance; 13. Of the Use of Sacraments; 14. Of Church Government; 15. Of Church Order; 16. Of Secular Government; 17. Of Christ's Second Coming to Judgment; 18. Of Free Will; 19. Of the Cause of Sin; 20. Of Faith and Good Works; 21. Of the Worship of Saints. The second and more practical part, which is carried out at greater length, contains seven articles on disputed points: 22. On the Sacrament in Two Kinds; 23. Of the Marriage of Priests; 24. Of the Mass; 25. Of Confession; 26. Of Distinctions of Meat; 27. Of Conventual Vows; 28. Of the Authority of Bishops.

This document, signed by seven Protestant princes and two free cities, was read before the emperor and the diet, 25th June 1530. Melanchthon, not looking upon the Confession as binding, began shortly after to make some alterations in its expression; at last, in 1540, he published a Latin edition (*Confessio Variata*) in which there were important changes and additions. This was especially the case with the article on the Lord's Supper, in which, with a view to conciliation, he endeavoured to unite the views of the Lutherans and Calvinists. This gave rise subsequently to much controversy; orthodox Lutheranism repudiated the alterations of Melanchthon, and long continued to subject his memory to great abuse; though it is clear that Melanchthon and his adherents contemplated no substantial departure in doctrine from the original Confession. It is not certain that the form of the Confession found in the Lutheran standards is identical with the unaltered Augsburg Confession, as the two original documents—German and Latin—laid before the diet have been lost. The chief distinction between the orthodox Lutherans and the reformed churches of Germany has all along been adherence to the 'unaltered' or to the 'altered' Confession. It was even a matter of controversy whether the 'reformed' were entitled to the rights secured to the Protestants by the Religious Peace of Augsburg, concluded in 1555, on the ground of the 'unaltered' Confession; and few modern German Protestants, save a minority of the 'Confessional' Lutherans, would claim it as a statement of their faith.

There are books on the 'Augustana' by Rudelbach (1841), Plitt (1868), Zöckler (1870), and Kolde (1896); and see the article in the Hauck-Herzog *Enzyklopädie* (1896–1910) and Köstlin's Life of Luther.

Augsburg Interim. See INTERIM.

Auguries and **Auspices,** the observation and interpretation of omens as a means of obtaining knowledge of secret or future things. The general doctrine of the interpretation of divine revelation is called *Divination* (q.v.), and this more general term includes both *artificial* divination by prodigies, lightning, astrology, lots, observation of the flight or feeding of birds, and the appearance of the entrails of animals or haruspication, as well as *natural* divination through dreams and prophetic oracles. There was no natural divination among the Romans—they had not conceived, like the Greeks, that notion of inward inspiration and insight, by which a human soul is enlightened by a fateful intuition and made to participate for an instant in the divine omniscience. The supernatural faculty is confined to the gods themselves, and they speak directly to men through the passive organs of animals. From the very dawn of Roman history divination is a kind of political institution. It does not develop the curiosity of the mystic; it reduces revelation to nothing more than simply information on the actual dispositions of the gods, only touching indirectly the past and the future. It only asks one problem—to know if the gods encourage or not the design about which they are consulted; it awaits the reply from Jupiter himself, and forbids the inquiry to be made otherwise than through certain conventional signs. The augural art does not go further than this. If in certain grave conjunctions it was found insufficient, the Romans preferred to consult the Etruscan *haruspices* or the Hellenic oracles rather than to add anything to their traditional customs.

The two Latin words *augur* (*avis*, 'a bird,' and a root allied to Sanskrit root *gar*, 'to call') and *auspex* (for *avispex*, from *avis*, 'a bird,' and *spicio*, 'I see') differed originally as a general idea from a particular one, since the latter observed only the flight of birds. Yet as this latter kind of augury was the most common, the two words are frequently interchanged or employed in connection. Neither vaticination or direct revelation, nor the interpretation of fortuitous presages, was so much esteemed by the Romans as the observation of birds. It was the function of the augurs to make these observations and explain their significance. It was not, however, any one who could be appointed an augur. The gods selected their own interpreters—that is to say, they conferred the divine gift upon them from their very birth; but an educational discipline was also considered necessary, and hence a 'college of augurs' figures in the very dawn of Roman history. Romulus himself is represented in legend as an augur. Previous to the Ogulnian law, passed in the year 307 B.C., there were only four augurs, who were selected from the patricians. By this law, however, the plebeians became eligible for the pontifical or augural offices, and five were immediately created. For more than two hundred years the number continued the same, till Sulla in 81 B.C. increased it to fifteen. Finally, in the first days of the Empire, when all parties, sick of the long civil wars, hurried to throw their privileges at the feet of the monarch who had brought peace into their homes, the right of electing augurs at his pleasure was conferred on Augustus, after which the number became indefinite.

At first, the augurs were elected by the *Comitia Curiata;* but as the sanction of the former was necessary to give validity to the acts of the latter, they could always veto any elections which were obnoxious to them; so that the power of electing members to fill up vacancies naturally fell into the hands of the college itself, and so continued till 103 B.C., when a tribune of the people named Ahenobarbus carried a law by which it was enacted that

for the future, vacancies in the augural and pontifical offices should not be filled up by those religious corporations themselves, but by a majority of certain selected tribes. This new law was occasionally repealed and re-enacted during the civil wars which lasted till the time of Augustus. The scramble for power, however, during these political vicissitudes, as well as the general advance of knowledge, had rendered the prophetic pretensions of the augur's office ridiculous in the eyes of educated people. By Cicero's time it had lost its religious character altogether, but was still regarded as one of the highest political dignities, and coveted for the power it conferred.

The modes of divination employed by the augurs were five in number—*augurium ex cælo, ex avibus, ex tripudiis, ex quadrupedibus, ex diris.* The *first* related to the interpretation of the celestial phenomena, such as thunder and lightning, was apparently of Etruscan origin, and was held to be of supreme significance. The *second* related to the interpretation of the noise and flight of birds. It was not every bird, however, that could be a sure messenger of the gods. Generally speaking, those 'consulted' were the eagle, vulture, crow, raven, owl, and hen. The first two belonged to the class of *alites*, or birds whose *flight* revealed the will of the gods; the last four to the class of *oscines*, whose *voice* divulged the same. These two modes of augury were the oldest and most important. Of the other three, the auguries *ex tripudiis* were taken from the feeding of chickens; the auguries *ex quadrupedibus*, from four-footed animals—as, for instance, if a dog, or wolf, or hare ran across the path of a Roman, and startled him by any unusual motion, he mentioned it to an augur, who was expected to be able to advise him what to do; the auguries *ex diris* (a vague kind of augury), from any trifling accidents or occurrences not included in the previous four—such as sneezing, stumbling, spilling salt on the table, and the like.

At Rome, the auspices were taken on the summit of the Capitoline Hill; and the ground on which the augur stood was first solemnly set apart for the purpose. He next took a wand, and marked out a portion of the heavens in which his observations were to be made. This imaginary portion was called a *templum* (hence *contemplari*, 'to contemplate'), and was subdivided into right and left. According as the birds appeared in either of these divisions were the auspices favourable or unfavourable. How vast the political influence and authority of the augurs must have been is seen from the fact that almost nothing of any consequence could take place without their sanction and approval. The election of every important ruler, king, consul, dictator, or prætor, every civic officer, every religious functionary, was invalid, if the auspices were unfavourable. No general could lawfully engage in battle—no public land could be allotted—no marriage or adoption, at least among the patricians, was held valid—unless the auspices were first taken, while the Comitia of the Centuries could be dispersed at a moment's notice by the veto of any member of the augural college.

Not the augurs alone, but the chief magistrates of Rome (inheriting the honour from Romulus), held the 'auspices,' while the 'auguries' were exclusively in the possession of the former. The power of taking the auspices in war was confined to the commander-in-chief; a victory gained by a legate was won under the auspices of his superior—hence our loose use of the phrase. Cato's remark about Haruspices (q.v.) quoted by Cicero—a member of the College of Augurs—is commonly but erroneously made to refer to augurs. Auguries were eclipsed in the classical period by the inspection of entrails—probably a sub-rite of sacrifice.

It must not be supposed that it was among the Romans alone that augury was practised. It is well known in the folklore of every race, and there are few English peasants to whom the magpie and cuckoo are not still significant. Tylor quotes in his *Primitive Culture* many instances which show that it has always been and is still part of the doctrine of the savage in whatever quarter of the globe he is found. It is familiar to the Tupis of Brazil and the Dayaks of Borneo. The Maoris think it unlucky if an owl hoots during a consultation, but are encouraged if a hawk flies overhead; a flight of birds to the right of the war-sacrifice is propitious if the villages of the tribe are in that quarter, but if the omen is in the enemies' direction the war will be given up. The Kalmuck is happy when a white owl flies by on the right, but expects calamity when he sees one on the left; and to the negro of Old Calabar the direction in which he hears the cry of the great kingfisher has exactly the same significance. Haruspication also is practised by the Malays and Polynesians and by various Asiatic tribes. It was practised in Peru under the Incas, and Sir Richard Burton's account of it in Central Africa shows it closely to resemble that in use among the civilised Romans.

See Bouché-Leclerq, *La Divination dans l'Antiquité* (1880–82), and Halliday's *Greek Divination* (1913).

August, the sixth month in the Roman year, which began with March, was originally styled *Sextilis*, and received its present name in honour of the Emperor Augustus, several of the most fortunate events of his life having occurred during this month. In this month he was first admitted to the consulate, and thrice entered the city in triumph. In the same month, the legions from the Janiculum placed themselves under his auspices, Egypt was brought under the authority of the Roman people, and an end put to the civil wars. To make it equal with the fifth month, whose name had been changed from *Quintilis* to *Julius* in honour of Julius Cæsar, a day was taken from February and added to August.

Augusta, or AGOSTA, a fortified city of Sicily, 19 miles N. of Syracuse by rail. It stands on a rocky islet joined by a bridge to a peninsula projecting into the Mediterranean, and is near the site of the *Megara Hyblæa* of the ancients. The port is spacious, but difficult of access. Salt, oil, wine, cheese, fruit, honey, grain, and sardines are exported. Pop. (commune) 20,254. The town often suffered during the wars of the middle ages, and was in great part destroyed by earthquakes in 1693 and in 1848. Near it was fought in 1676 a great naval battle between the French under Duquesne, and a Spanish and Dutch fleet under the famous admiral De Ruyter. The latter was defeated, and received a wound of which he died at Syracuse.

Augusta, the capital of Maine, U.S., on the Kennebec, 63 miles NNE. of Portland by rail. It stands at the head of regular navigation, but small steamers run 18 miles higher. A dam, 17 feet high, affords considerable watèr-power, which is rendered available by a canal along the west bank, on which side the city is principally built. There are several cotton, pulp, paper, and other mills. Besides the state-house and other administrative buildings, Augusta contains a U.S. arsenal, state library, and insane asylum; and at Togus, 4 miles distant, is situated one of the national institutions for disabled soldiers, with accommodation for 1350 persons. Pop. 14,000.

Augusta, the second city of Georgia, U.S., is situated on the Savannah River, 231 miles from its mouth, but only 132 miles from Savannah by rail. It is the head of steamboat navigation on the river, which is here spanned by three bridges,

connecting the town with Hamburg, S.C., and which is crossed by a stone dam, 1720 feet in length, from which a canal, 8 miles long and 150 feet wide, supplies water both for domestic use and for the mills. The water-power is copious and the industries extensive, there being numerous cotton-mills, also foundries, large chemical, flour, and other works. There is a very large trade in cotton, and fruit growing is carried on. Augusta is the seat of the Medical College of Georgia (1832), and contains several other handsome public buildings. Pop. (1860) 12,493; (1920) 52,548.

Augustenburg, a village on a bay of the island of Alsen (q.v.). Its castle (1776) was formerly the residence of the Dukes of Holstein-Sonderburg-Augustenburg.

Augusti, JOHANN CHRISTIAN WILHELM, a learned German theologian, born in 1772 near Gotha. He studied at Jena, and successively filled there the chairs of Philosophy and of Oriental Languages. But in 1812 he accepted a theological professorship in Breslau, and in 1819 one at Bonn. He died in 1841. In the early part of his career, Augusti was a decided rationalist; but subsequently he returned to orthodox Lutheranism. His writings, marked by great learning, industry, and spirit, comprise works in the history of Christian dogma and an introduction to the Old Testament; but the most valuable is his manual of Christian Archæology (Leip. 3 vols. 1836–37).

Augustine, ST (AURELIUS AUGUSTINUS), the greatest of the Latin fathers, was born at Tagaste, a town of Numidia, on the 13th of November 354 A.D. His father, Patricius, was poor, but of good family, and filled the office of magistrate. He continued a pagan till advanced in years, and was only baptised shortly before his death. He does not seem to have been remarkable for any elevation of mind; on the contrary, one may fairly conclude, from his son's statements, that he was an irascible, kind-hearted man, more intent on his son's advancement in this world than in that which is to come. Patricius was very anxious that Augustine should become a fine scholar, as he noticed that not a few people in his day were obtaining large incomes by their 'wits.' Augustine was accordingly sent to school at Madaura, and subsequently to Carthage, to complete his studies. Previous to this, however, he had enjoyed the inestimable felicity of a religious education at home. His godly mother, Monica, had been his best instructor. Neander truly says: 'Whatever treasures of virtue and worth the life of faith, even of a soul not trained by scientific culture, can bestow, were set before him in the example of his pious mother.'

The energy and penetration of intellect exhibited by the young Augustine excited the most flattering hopes. When he left home for Carthage, a joyous, ardent, and resolute student, a bright career of worldly prosperity seemed to open before him. But strong as Augustine was, the temptations of Carthage were stronger. His nature, deep, impetuous, and passionate, thirsted for excitement. He had just reached the age when pleasure is conceived to be synonymous with happiness, and Carthage, the second city of the empire, was rank as Rome in its sensual corruptions. Augustine fell. In his *Confessions* he paints the frightful abyss into which he felt himself plunged; nor does he seek to excuse himself; on the contrary, the shadow of his guilt is thrown forward over all his boyish life, and he displays even a morbid zeal and acuteness in pointing out what others, less censorious, might term the frivolous errors of his childhood, but which seemed to Augustine the parents of his subsequent vices, and therefore equally bad and equally reprehensible. Before he had reached his eighteenth year, his mistress bore him a son, who was named Adeodatus—afterwards baptised along with him at Milan. The thing which appears to have first stirred his deeper being into life was a passage which he suddenly came across in the *Hortensius* of Cicero, treating of the worth and dignity of philosophy. Fascinated by 'the delusive pretensions of the Manichæan sect, which, instead of a blind belief on authority held out the promise of clear knowledge and a satisfactory solution of all questions relating to things human and divine,' Augustine now became a professed Manichæan. Returning to his native town, he lectured for a short time on 'grammar'—that is to say, on literature. Soon afterwards, he returned to Carthage, to pursue his profession under more favourable auspices. Here he wrote, in his twenty-seventh year, his first work, *De Apto et Pulchro*—a treatise on æsthetics, which has unfortunately been lost. About the same time his spiritual nature became keener and more imperative in its demands. The futile speculations of the visionary sect to which he had attached himself now became apparent. He had a series of interviews and conversations with Faustus, one of the most celebrated teachers of Manichæism; and these so utterly disappointed his expectations, that he left the society in disgust and sad bewilderment, after having wasted ten years in a fruitless search for wisdom and truth.

In 383 he went to Rome, followed by the tears, the prayers, and the anxieties of his excellent mother, who was not, however, bereaved of hope, for both her faith and her love were strong. After a short stay, Augustine left Rome, and proceeded to Milan, where he became a teacher of rhetoric. No change could have been more fortunate. At this time the Bishop of Milan was the eloquent and devout St Ambrose. An intimacy sprang up between the two, and Augustine, who was at this time a zealous student of Plato, often went to hear his friend preach. He confesses that the Platonic writings 'enkindled in his mind an incredible ardour;' they awakened his deeper spiritual nature, which keenly upbraided him with his sins. Once more he studied the Bible, wishing to find in it 'those truths which he had already made himself acquainted with from the Platonic philosophy, but presented in a different form.' He began to think that Christ and Paul, by their glorious life and death, their divine morality, their great holiness, and manifold virtues, must have enjoyed much of that 'highest wisdom' which the philosophers thought confined to themselves. For some time he clung to his Platonic Christianity, and shaped the doctrines of the Bible according to it; but when he found that it was weak to overcome temptations, and that 'he himself was continually borne down by the ungodly impulses which he thought he had already subdued,' the necessity of a living personal God and Saviour to rescue him from the condemnation of his own conscience, and impart a sanctifying vitality to the abstract truths which he worshipped, shone clear through all the stormy struggles of his heart. In the eighth and ninth books of his *Confessions* he has left a noble though painful picture of his inward life during this momentous crisis. It is sufficient to say that the Spirit of God triumphed. On the 25th of April 387 A.D., Augustine, along with his natural son Adeodatus, was baptised by Ambrose at Milan. Shortly after, he set out on his return home. At Ostia, on the Tiber, his beloved mother, who had followed him to Milan, died; her eyes had seen the salvation of her son, and she could depart in peace. After her death, and before leaving Italy for Africa, Augustine wrote his treatises, *De Moribus*

Ecclesiæ Catholicæ et de Moribus Manichæorum; De Quantitate Animæ; and *De Libero Arbitrio.* His character and principles of action had become fixed, and he now brought the whole majesty of his intellect to bear upon the side of Christianity. Having, as was then customary for converts, divided his goods among the poor, he retired into private life, and composed several treatises—*De Genesi contra Manichæos, De Musicâ, De Magistro,* and *De Verâ Religione,* which secured him a high reputation. In 391 he was ordained a priest by Valerius, Bishop of Hippo in Numidia; and during the next four years, though earnestly engaged in the work of preaching, contrived to write three different works. In 395 he was made colleague of Valerius. Then ensued a period of hot strife, known in church history as the Donatist and Pelagian controversies. Augustine, as may naturally be supposed, having passed through so fierce a fire of personal experience on religious questions, would be very jealous both of what he *knew* to be the truth, and of what he only *thought* to be the truth. This, added to his acute and profound intellect, made him, in spite of the poverty of his historical erudition, a most formidable and relentless antagonist. But this portion of his career will fall to be treated more properly under PELAGIUS and DONATISTS (q.v.). In 397 appeared his *Confessiones,* in 13 books. It is a deep, earnest, and sacred autobiography of one of the greatest intellects the world has seen. Passages of it have no parallel except in the Psalms of David. In 413 he commenced his *De Civitate Dei,* and finished it in 426. It is generally considered his most powerful work. Intended to be a great vindication of the Christian church, conceived of as a new order rising on the ruins of the old Roman empire, it is not only the grandest and most philosophical of the earlier monuments of Christian theology, but one of the most profound and lasting monuments of human genius. Yet exception may be taken to much that it contains. The learning is no doubt very considerable, but it is not accurate. Augustine was an indifferent scholar; he had studied the Latin authors well; but of Greek 'he knew little, and of Hebrew, nothing,' consequently many of his reasonings are based on false and untenable premises, and he errs often in his etymological explanations. In 428 Augustine published his *Retractationes,* in which he makes a recension of all his previous writings. It is a work of great candour. He frankly acknowledges such errors and mistakes as he had discovered himself to have committed, explains and modifies numerous statements, and modestly reviews his whole opinions. His end was now drawing nigh. In 429 the Vandals, under the barbarian Genseric, landed in Africa; next year they besieged Hippo. Augustine, now in his seventy-sixth year, prayed that God would help his unhappy church, and grant himself a release out of this present evil world. He died on the 28th of August 430, in the third month of the siege.

No mind has exerted greater influence on the church than that of Augustine. 'No controversy of his age was settled without his voice, and in his Letters (which fill a whole volume of the Benedictine edition of his works) we see the vastness of his empire, the variety of subjects on which appeal was made to him, and the deference with which his judgment was received.' Consistency of theological opinion is not to be looked for from him, nor from any of the church fathers. A larger sphere of freedom was permitted to religious speculation in those unfettered days, before creeds were encircled with that traditional sanctity they now possess. Nevertheless, we have little difficulty in determining the central tenets of his theological belief. He held the corruption of human nature through the fall of man, and the consequent slavery of the human will. Both on metaphysical and religious grounds, he asserted the doctrine of predestination, from which he necessarily deduced the corollary doctrines of election and reprobation; and finally, he strenuously supported, against the Pelagians, not only these opinions, but also the doctrine of the perseverance of the saints. At the same time, it is but fair to add that, even on such points, his language is far from uniform; that much of the severity of his doctrines arose from the bitter and painful remembrance of his own early sins, and from the profound impression which the corrupt state of society in his time, and the vast desolations of barbarism, had made on his earnest and susceptible soul; and that, in his desire to give glory to God, he sometimes forgot to be just to man. In illustration of this may be mentioned the fact that the maxim which justified the chastisement of religious errors by civil penalties, even to burning, was established and confirmed by the authority of Augustine, and thus transmitted to succeeding ages. In his epistle to Dulcitius, a civil magistrate who shrank from putting in force the edict of Honorius against heretics, he uses these words: 'It is much better that some should perish by their own fires, than that the whole body should burn in the everlasting flames of Gehenna, through the desert of their impious dissension.' In the opinion of Neander, it was to the somewhat narrow culture, and the peculiar personal experience and temperament of Augustine, that the doctrines of absolute predestination and irresistible grace, first systematised by him, owed much of that harshness and one-sidedness which so long obstructed their general reception by the church, and which continue to render them repulsive to multitudes. It was not, however, by his controversial writings merely, but by his profound conception of Christianity and the religious life, and by his personal fervour and force of character that Augustine moulded the spirit of the Christian church for centuries. The church regarded him as the greatest of the fathers, and at the Reformation Protestants and Catholics alike appealed to his authority. Calvinism is by many regarded as little more than a reassertion of Augustinianism, though this is denied by the Catholic Church; and Jansenism was held by its supporters as the only real expression of Augustine's views. See articles CALVIN, JANSEN, ELECTION, HELL, PREDESTINATION, WILL.

The best complete edition of his works is that of the Benedictines, published at Paris in 8 vols. (11 parts) folio (1679–1700; reprinted in 22 half-vols. 1836–40). They occupy 16 vols. (32–47) of Migne's *Patrologia Latina.* Numerous editions of the *Confessiones* and *De Civitate Dei* have appeared. A complete English translation of his works was published at Edinburgh in 15 vols. (1872–80) under the general editorship of Dr Marcus Dods, the *City of God* being by the editor, the *Confessions* by the Rev. J. G. Pilkington, the *Letters* by the Rev. J. G. Cunningham.

See the Church Histories and Milman's *Latin Christianity;* German works by Cloth (1840), Bindemann, Dorner, Böhringer (1878), Hertling (1902), Thimme (1910), Holl (1923); Poujoulat's monograph, and Bertrand's (1912); the article in Hauck-Herzog (1896); Harnack's *History of Dogma,* and *Monasticism* (trans. 1901); Beeching's introduction to Pusey's translation of the Confessions (1904); Cunningham's *St Austin and his Place in the History of Christian Thought* (1885); McCabe's *St Augustine and his Age* (1902); W. Montgomery's *St Augustine* (1914); Figgis's *Political Aspects of St Augustine's City of God* (1921).

Augustine, or AUSTIN, ST, first Archbishop of Canterbury, was prior of the Benedictine monastery of St Andrew at Rome, when, in 596, he was sent, with forty other monks, by Pope Gregory I., to convert the English to Christianity, and establish the authority of the Roman see in Britain. Landing in Thanet, the missionaries were kindly received by Ethelbert, king of Kent, whose wife Bertha, daughter of the Frankish king, was a Christian, and retained a bishop in her suite as chaplain. A residence was assigned to them at Canterbury, where they devoted themselves to monastic exercises and preaching. The conversion and baptism of the king contributed greatly to the success of their efforts among his subjects. Nominal as much of this conversion must have been, it is maintained that a marked improvement in the life and manners of the English followed the evangelistic labours of Augustine and his companions. In 597 he went to Arles, and there was consecrated Bishop of the English. On his return, he despatched a presbyter and monk to Rome, to inform the pope of his success, and obtain instruction on certain questions. Gregory's counsels with regard to the propagation of the faith are admirable examples of that pious ingenuity which has often characterised the missionary policy of the Church of Rome. Thus, instead of destroying the heathen temples, Augustine was recommended to convert them into Christian churches, by washing the walls with holy water, erecting altars, and substituting holy relics and symbols for the images of the heathen gods. Augustine's subsequent efforts to extend his authority over the native British church, with whose bishops he held a conference in 603 on the Severn, failed. He died in 604.

In 612 his body was translated to his abbey (SS. Peter and Paul), whose site is now occupied by St Augustine's Missionary College (1848). See GREGORY; Plummer's Bede; and books by Cutts (1895), Mason, Browne, Father Brou, S.J., Collins, Sir H. H. Howorth (1913).

Augustinians, the name given to several religious bodies in the Roman Catholic Church. Whether St Augustine ever framed any formal rule of monastic life, is uncertain; but one was deduced from his writings, and was adopted by as many as thirty monastic fraternities, of which the chief were the Canons Regular of St Augustine, the Begging Hermits or Austin Friars, the Friars Preachers or Dominicans (q.v.), and the Premonstratensians (q.v.). The Canons Regular of St Augustine, or Austin Canons, appear to have been founded or remodelled about the middle of the 11th century. Their discipline was less severe than that of monks properly so called, but more rigid than that of the secular or parochial clergy. They lived under one roof, having a common dormitory and refectory. Their habit was a long cassock, with a white rochet over it, all covered by a black cloak or hood, whence they were often called Black Canons. Probably founded at Avignon about 1061, they had their first seat in England at Colchester (*circa* 1105); and at the Reformation their houses somewhat exceeded 200 in number. Of some 25 houses in Scotland, the earliest was that of Scone (1114), and the others of most note were at Inchcolm in the Firth of Forth, St Andrews, Holyrood, Cambuskenneth, and Inchaffray.

The Begging Hermits, Hermits of St Augustine, or Austin Friars, were a much more austere order, renouncing all property, and vowing to live by the voluntary alms of the faithful. They are believed to have sprung from certain societies of recluses who, in the 11th and 12th centuries, existed especially in Italy without any regulative constitution. At the instigation, as is alleged, of the rival fraternities of Dominicans and Franciscans, Pope Innocent IV., about the middle of the 13th century, imposed on them the rule of St Augustine, whom they claimed as their founder. In 1256 Pope Alexander IV. placed them under the control of a superior or president called a 'general.' In 1287 a code of rules or constitutions was compiled, by which the order long continued to be governed. About 1570 Friar Thomas of Jesus, a Portuguese brother of the order, introduced a more austere rule, the disciples of which were forbidden to wear shoes, whence they were called *discalceati*, or 'barefooted friars.'

The degeneracy of the order in the 14th century, called into existence new or reformed Augustinian societies, among which was that Saxon one to which Luther belonged. But in his day, even these had fallen victims to the general corruption of monasticism, and were not undeserving of his unsparing denunciations. After the French Revolution, the order was wholly suppressed in France, Spain, and Portugal, and partly in Italy and Southern Germany. It was diminished even in Austria and Naples. It is most powerful in America, its colleges in the New World having been founded by Augustinians from the Irish province.

The name of Augustines was given also to an order of nuns who claimed descent from a convent founded by St Augustine at Hippo, of which his sister was the first abbess. They were vowed to the care of the sick and the service of hospitals. See GILBERTINES, TRINITARIANS.

Augustobona, See TROYES.

Augustodunum. See AUTUN.

Augusto'vo, a town of Poland, 138 miles NE. of Warsaw. Founded by King Sigismund Augustus in 1547, scene of Russian victories over the Germans in 1914–15, it has woollen and linen manufactures. The Netta, a feeder of the Bug, flowing out of a lake rich in fish, connects by canal with the Niemen. Pop. 12,000.

Augustulus, ROMULUS, the last emperor of the western half of the old Roman empire. His name was Augustus, but the diminutive title under which he is universally known was given him by the Romans on account of the essential littleness of his character. His father, Orestes, a Pannonian of good birth and wealth, had risen to high rank under the Emperor Julius Nepos, whose favour he repaid by stirring up the barbarian troops in the pay of Rome to mutiny against him. On the flight of the emperor, Orestes conferred the vacant throne on his son Augustulus (475 A.D.), retaining all substantial power in his own hands. Orestes failing to conciliate the barbarians, who had helped him against Nepos, with a grant of one-third of the lands of Italy, they, under the command of Odoacer, besieged him in Pavia, and killed him on the capture of the town. Augustulus yielded at once (476), and being of too little consequence to be put to death, was dismissed to a villa near Naples with an annual pension of 6000 pieces of gold. His after-fate is unknown.

Augustus, CAIUS JULIUS CÆSAR OCTAVIANUS, son of Caius Octavius and Atia (Julius Cæsar's niece), was born in 63 B.C. The Octavian family came originally from Velitræ, in the country of the Volsci; and the branch to which Augustus belonged was rich and honourable. His father had risen to the rank of senator and prætor, but died in the prime of life, when Augustus was only four years old. Augustus was carefully educated in Rome under the guardianship of his mother and his step-father; and his talents recommended him to his great-uncle, Julius Cæsar, who adopted him as his son and

heir. At the time of Cæsar's assassination (44 B.C.), Augustus was a student under the celebrated orator Apollodorus, at Apollonia in Illyricum, whither, however, he had been sent chiefly to gain practical instruction in military affairs. He returned to Italy, and, now first learning that he was his uncle's heir, assumed the name of Julius Cæsar Octavianus. The soldiers at Brundusium saluted him as Cæsar; but he declined their offers, and entered Rome almost alone. The city was at this time divided between the republicans and the friends of Mark Antony; but the latter, by adroit manœuvres, had gained the ascendency, and enjoyed almost absolute power. At first, Augustus was haughtily treated by Antony, who refused to surrender Cæsar's property; but after some fighting, in which Antony was worsted, and forced to flee across the Alps, Augustus, who had made himself a favourite with the people and the army, obtained the consulship, and carried out Cæsar's will. He found an able advocate in Cicero, who at first had regarded him with contempt. To himself the great orator seemed to be labouring in behalf of the republic, whereas he really was only an instrument for raising Augustus to supreme power. When Antony returned from Gaul with Lepidus, Augustus threw off the republican mask, and joined them in establishing a triumvirate. He obtained Africa, Sardinia, and Sicily; Antony, Gaul; and Lepidus, Spain. Their power was soon made absolute by the massacre of those unfriendly to them in Italy, and by the victory at Philippi over the republicans under Brutus and Cassius. The Perusian war, excited by Fulvia, wife of Antony, seemed likely to lead to a contest between Augustus and his rival; but was ended by Fulvia's death, and the subsequent marriage of Antony with Octavia, sister of Augustus. Shortly afterwards, the Roman world was divided anew, Augustus taking the western half, and Antony the eastern, whilst Lepidus had to content himself with Africa. The contest for supremacy commenced. While Antony was lost in luxurious dissipation at the court of Cleopatra, Augustus was industriously striving to gain the love and confidence of the Roman people, and to damage his rival in public estimation. War was at length declared against the Egyptian queen, and at the naval battle of Actium (31 B.C.), Augustus was victorious, and became sole ruler of the whole Roman world. Antony and Cleopatra soon afterwards ended their lives by suicide; Antony's son by Fulvia, and Cæsarion, son of Cæsar and Cleopatra, were put to death; and in 29 B.C., after regulating affairs in Egypt, Greece, Syria, and Asia Minor, Augustus returned to Rome in triumph, and, closing the temple of Janus, proclaimed universal peace.

His subsequent measures were mild and prudent. To insure popular favour, he abolished the laws of the triumvirate, and reformed many abuses. Hitherto, since Cæsar's death, he had been named Octavian; but now the title of *Augustus* ('sacred' or 'consecrated') was conferred on him. In his eleventh consulship (23 B.C.), the tribunician power was granted him for life by the senate. Republican names and forms still remained, but they were mere shadows; and Augustus, in all but name, was absolute monarch. In 12 B.C., on the death of Lepidus, he had the high title of Pontifex Maximus bestowed on him. The nation surrendered to him all the power and honour that it had to give.

After a course of victories in Asia, Spain, Pannonia, Dalmatia, Gaul, &c., Augustus (9 B.C.) suffered the one crushing defeat of his long rule, in the person of Quintilius Varus, whose army was annihilated by the Germans under Arminius (q.v.). The loss so afflicted Augustus, that for some time he allowed his beard and hair to grow, as a sign of deep mourning, and often exclaimed: 'O Varus, Varus, give me back my legions!' Thenceforth he confined himself to plans of domestic improvement and reform, and so beautified Rome, that it was said, 'Augustus found the city built of brick, and left it built of marble.' He also built cities in several parts of the empire; and altars were raised by the grateful people to commemorate his beneficence; while by a decree of the senate, the name Augustus was given to the month *Sextilis*.

Though thus surrounded with honour and prosperity, Augustus was not free from domestic trouble. The abandoned conduct of his daughter Julia was the cause of sore vexation to him. He had no son, and his nephew Marcellus, and Caius and Lucius, his daughter's sons, whom he had appointed as his successors and heirs, as well as his favourite step-son Drusus, all died early; while his step-son Tiberius was an unamiable character whom he could not love. Age, sorrow, and failing health warned him to seek repose; and, to recruit his strength, he undertook a journey to Campania; but his infirmity increased, and he died at Nola (14 A.D.), in the seventy-seventh year of his age. According to tradition, shortly before his death, he called for a mirror, arranged his hair neatly, and said to his attendants: 'Did I play my part well? If so, applaud me!' Augustus had consummate tact and address as a ruler and politician, and made use of the passions and talents of others to forward his own designs. The good and great measures which marked his reign were originated mostly by himself. He encouraged agriculture, patronised the arts and literature, and was himself an author; though only a few fragments of his writings have been preserved. Horace, Virgil, Ovid, Propertius, Tibullus, and Livy adorned the *Augustan Age*—a name since applied in France to the reign of Louis XIV., in England to that of Queen Anne. See books on Augustus by Shuckburgh (1903), Firth (1903), Gardthausen (1891–1904).

Augustus, Elector of Saxony (1553–86), was born July 31, 1526, at Freiberg, and spent much of his boyhood at Prague, where he formed an intimate friendship with Maximilian, King Ferdinand's son, afterwards Emperor of Germany. In 1548 he married Anna, daughter of Christian III. of Denmark, who was universally popular on account of her devoted adherence to Lutheranism and her domestic worth. After the death of his brother Maurice in 1553, Augustus succeeded to the electorate. His rule is chiefly noticeable as bearing upon the history of the newly established Protestant Church. Equally intolerant and inconsistent in his theology, Augustus first used his utmost influence in favour of the Calvinistic doctrine of the sacraments; and then, in 1574, adopted the Lutheran tenets, and persecuted the Calvinists. On the other hand, it must be owned that he introduced valuable reforms in both jurisprudence and finance, and gave a decided impetus to education, agriculture, manufactures, and commerce. The Dresden Library owes its origin to him, as do also most of its galleries of art and science. He died at Dresden, February 11, 1586, and was succeeded by his son, Christian I.

Augustus II. (more accurately, FREDERICK-AUGUSTUS I.), Elector of Saxony and king of Poland, second son of the Elector, John George III., was born at Dresden, May 12, 1670. His extraordinary strength gained him the nickname of 'the Strong.' From 1687 to 1689 he travelled over the greater part of Europe, and in 1694 succeeded his brother George as Elector, and

undertook the command of the imperial army against the Turks in Hungary. After the battle of Olasch, in 1696, he returned to Vienna as a candidate for the throne of Poland, vacated by John Sobieski. Bidding higher than Prince Conti for the crown, and adopting the Catholic faith, he was elected king by the venal nobles, and was crowned in 1697. On ascending the throne, he promised to regain, for his new kingdom, the provinces that had been ceded to Sweden; but his efforts to do this only led to the defeat of himself and his allies, his own deposition as king of Poland, the election of Stanislaus Leszczynski, and the ignominious peace of Altranstadt in 1706. So complete was his humiliation, that Augustus was compelled to send a letter of congratulation to the new Polish king, together with all the crown-jewels and archives. However, on the defeat of Charles XII. at Pultowa, in 1709, he declared the treaty of Altranstädt annulled, marched with a powerful army into Poland, formed a fresh alliance with the tsar, and recommenced a war with Sweden, which continued raging with redoubled fury, till the death of Charles XII., in 1718, led to a peace with Sweden. Meanwhile, the jealousy of the Poles caused the withdrawal of the Saxon troops in 1717. The remainder of the reign is marked by no important event, till the king's death, 1st February 1733. The Saxon court gradually became known as the most dissolute in Europe, and the resources of both states were shamefully squandered to supply its extravagances. Augustus supported the fine arts as ministering to luxury, but did little for the cause of science. Reckless, selfish, ambitious, luxurious, licentious, and despotic, he is powerfully depicted in Carlyle's *Frederick the Great.* By his wife he left an only son, who succeeded him. The most celebrated of his numerous illegitimate offspring—amounting, it is affirmed, to somewhere about 350—was Count Maurice of Saxony (see SAXE).

Augustus III. (or FREDERICK-AUGUSTUS II.), the son and successor of the above, was born at Dresden, October 7, 1696, and carefully educated by his mother in the Protestant faith. In the course of a tour through Europe, however, he changed his religion, secretly professing Catholicism at Bologna in 1712, though the fact was not publicly known in Saxony till five years later. He succeeded his father as Elector in 1733, and was chosen king of Poland by a part of the nobility. Jealousy of French influence secured him the support of Russia and Austria against Stanislaus Leszczynski, who had married a daughter to Louis XV., and three years later Augustus was elected. He inherited his father's sumptuous tastes, though not his talents; and he enriched the gallery of Dresden with noble paintings, for which, and its china, his capital now began to be celebrated. In 1742, alarmed at the increased power Prussia had obtained by the conquest of Silesia, Augustus formed an alliance with Maria Theresa: and by the secret treaty of Leipzig, contracted to supply her with 50,000 men. But their united troops were completely routed by the Prussians in 1745; and Frederick II. pushing on into Saxony, Augustus had to escape from his capital, saving his art-treasures, but leaving his state-papers in the hands of the conqueror. In 1746 the peace of Dresden restored him Saxony; but 1756 (see SEVEN YEARS' WAR) again saw him embroiled with Prussia. Joining the camp at Pirna, he narrowly escaped being taken prisoner, and had to flee to Poland. At the conclusion of the peace of Hubertsburg, Augustus returned to Dresden, where he died, October 5, 1763. The notorious Count Brühl (q.v.) was his favourite, and from 1746 onwards, his prime-minister. His son, Frederick-Christian, succeeded him in the electorate, and Stanislaus Poniatowski became king of Poland.

Auk (*Alca*), a genus of pelagic birds, familiarly represented by the Razor-bill (*Alca torda*), which ranges from Jan Mayen and Greenland to Maine and Brittany, or even farther south. The flightless Great Auk or Garefowl (*Alca impennis*) of the North Atlantic has not been seen since 1844. The Little Auk or Rotche, a bird of passage off British coasts, is referred to a different genus, and is known as *Mergulus alle;* similarly the Guillemots belong to nearly related genera (Uria, Cepphus), the Auklets to others (e.g. Cerorhyncha, Cyclorhynchus), and the Puffins to others (Fratercula, Lunda). All these birds are included in the family Alcidæ, which is equivalent to the sub-order Alcæ, regarded by some good authorities as made up of highly specialised derivatives of a plover stock. In any case, auks have no relationships with divers or with penguins. Among their general characters may be noted the elongated body, well suited for locomotion under water; the backward shunting of the legs, which increases the speed and power of the stroke and explains the curious upright attitude of the birds when sitting on the rocks; the greatly elongated ribs and hip-girdle; the short wings, usually capable of strong and rapid flight; the webbed feet; the close plumage, usually black or brown and white; the short tail; and the strong bill suited for fish-catching. They are typically open sea birds, but their breeding-places are usually on cliffs and steep shores. There is usually a single egg, which is laid on a rocky ledge (razor-bill, guillemot, &c.) or in a burrow (puffin). The auks are confined to the northern hemisphere, with their headquarters in the North Pacific, though a number of species inhabit the North Atlantic. The Great Auk (*Alca impennis*), also known as the Garefowl, used to occur in the North Atlantic, but apparently not within the arctic circle. It was hunted down by the northern fishermen to furnish food and bait, and it was finally exterminated by collectors for museums. It resembled an exaggerated razor-bill, and was nearly the size of a tame goose. A large patch of white occurred on the glossy black head between the eyes and the bill. The small wing was incapable of supporting the bird in flight, and low islets were therefore used as breeding-places. The large egg (about 5 inches in length) resembled that of a razor-bill, but was

The Great Auk (*Alca impennis*).

more variable, and some of those that are treasured in collections show the greenish ground colour or the curious scrollings more characteristic of the guillemot. Records describe the Great Auk as exceedingly expert in the water, and exceedingly helpless on land. Reports of its tameness or stupidity probably mean that it had not experience of what the presence of man implied. Remains have been found in many parts of Ireland, in parts of Scotland, of the north of England, and of Denmark, on the coast of Maine and Massachusetts, and abundantly on Funk Island. On the other side of the Atlantic the bird got the name 'penguin,' now transferred to a very different type. Over seventy eggs and a somewhat larger number of birds remain in museums as residues of this interesting species. An egg has been known to fetch £200, and a specimen twice as much. See Symington Grieve, *The Great Auk or Garefowl* (Edin. 1885); F. A. Lucas, 'Expedition to the Funk Island, with Observations upon the History and Anatomy of the Great Auk,' *Report U.S. National Museum, 1887–88*, pp. 493–529. A selected bibliography will be found in Newton's *Dictionary of Birds* (1893), p. 308.

Aulapolai', ALAPULAI, or ALLEPPEY, the chief seaport (with a lighthouse) of the Travancore state, Madras, 33 miles S. of Cochin. Its roadstead is sheltered by a mud-bank; and there is a considerable trade in coffee, coir, pepper, and cardamoms. Communication is maintained with the railway at Quilon on the south, and at Cochin on the north, by canals parallel with the sea-coast, and connecting a series of lakes or back-waters. Between these and the sea is a wide creek, through which is floated the timber for exportation, which is brought from the forests of the Rajah of Travancore on the Western Ghauts. Pop. 25,000.

Aula Regis, also called CURIA REGIS, is a name used in English history for a feudal assembly of tenants-in-chief, for the Privy-council (q.v.), and for the court of King's Bench. See COMMON LAW.

Auldearn, a Nairnshire village, 2½ miles ESE. of Nairn. Near it Montrose won his fourth victory, 9th May 1645. Pop. 300.

Aulic Council (Lat. *aula*, 'court' or 'hall;' Ger. *Reichshofrath*), a court of the Holy Roman empire, established in 1501 by Maximilian I., and co-ordinate with the Imperial Chamber (*Reichskammergericht;* established 1495). See Bryce's *Holy Roman Empire*.

Aulis, a small port of Bœotia on the Euripus, near the modern Vathy, was famous as the starting-place of the Greek fleet for Troy. In its temple of Artemis Iphigenia was to be sacrificed.

Aulnoy, MARIE CATHERINE JUMELLE DE BERNEVILLE, COMTESSE D', was born about 1650, and died in 1705. She wrote many tedious and long-winded romances long consigned to safe oblivion. Of these need here only be mentioned *L'Histoire d'Hippolyte, Comte de Douglas* (1690). Equally worthless are her historical memoirs. But her fame rests securely on her *Contes des Fées*, which are written in a simple, bright, and charming style, not altogether unworthy of the inimitable master, Perrault. The White Cat, the Yellow Dwarf, Finette Cendron, and Le Mouton have for two centuries been naturalised in the nurseries of Europe, and have been familiar figures in pantomime. See Lady Richmond Ritchie's introduction to an English translation of the *Fairy Tales* (1892).

Aulus Gellius. See GELLIUS.

Aumale (earlier *Albemarle*), a French town of 2400 inhabitants, in the department of Seine-Inférieure, on the Breste. From 1547 it gave the title of duke to various families.—AUMALE, a town of Algeria, 57 miles SE. of Algiers. It is a strong military post. Pop. 4000.

Aumale, CHARLES DE LORRAINE, DUC D', born 1556, was an ardent partisan of the League in the religious wars which devastated France in the latter half of the 16th century. The aim of the League was ostensibly to suppress the Huguenots, but in reality to secure the supreme power to the Guises. Closely allied by blood to this crafty and ambitious family, Aumale, after the murder of the Duke of Guise in 1588, became, along with the Duke of Mayenne, the leader of the party. Defeated at Senlis by the Duke of Longueville, and at Arques and Ivry by Henry IV., he still attempted to defend Paris, and when Henry was recognised as king in France, he went over to the Spaniards, refused the royal pardon, and delivered over to the enemy several places in his possession. For this he was impeached, condemned, and sentenced to be broken alive on the wheel. His property was confiscated, but he himself escaped. He lived in exile till his death, which took place at Brussels in 1631. With him the old Dukes d'Aumale of the house of Lorraine became extinct.

Aumale, HENRI - EUGÈNE - PHILIPPE - LOUIS D'ORLÉANS, DUC D', fourth son of King Louis-Philippe, was born at Paris, January 16, 1822. Educated at the college of Henri IV., at sixteen he entered the army, and two years later found himself in active service in Algeria, where he soon distinguished himself by his bravery, and passed rapidly through the various grades of rank. One of his most brilliant exploits was the surprise of Abd-el-Kader in May 1843. For this he was made lieutenant-general, and appointed to the government of the province of Constantine. In 1847 he succeeded Marshal Bugeaud in the governor-generalship of Algeria, but after the revolution of February 1848, laid down his office, and retired to England. In his exile he occupied himself with historical and military studies, and soon became known by his contributions to the *Revue des Deux Mondes*. A speech of Prince Napoleon in the senate against the Orleans family called forth in April 1861 his famous pamphlet, *Lettre sur l'Histoire de France*, in which the prince and Napoleon III. were subjected to a merciless castigation. His great historical work, *Histoire des Princes de Condé* (Paris, 1869), was published only after much difficulty. In the journal *Étoile Belge* there appeared (1865–66) a series of critical letters by him, under the pseudonym of 'Verax,' on the policy of the empire, and in 1867 his celebrated work, *Les Institutions militaires de la France*. On the outbreak of the Franco-German war, he offered his services, first to the emperor, afterwards to the provisional government, without being accepted by either, but in 1871 he was elected a member of the Assembly. In 1873 he presided over Marshal Bazaine's court-martial, and afterwards held several high commands, but was disqualified from further service in 1883. Elected a member of the Academy in 1871, in 1886 he bequeathed his magnificent château of Chantilly to the Institute of France. The decree expelling him from Paris was revoked in 1889. He died 6th May 1897, in consequence of the shock caused by the burning of his niece, the Duchess d'Alençon, at the Paris bazaar. His wife (*née* Marie Caroline Auguste de Bourbon, daughter of the Prince of Salerno) had died in 1867; his elder son in 1866, the younger in 1872. See Ernest Daudet's *Le Duc d'Aumale* (1898).

Aungerville, RICHARD, Bishop of Durham, is known as Richard de Bury, from his birthplace, Bury St Edmunds. He was born in 1281, studied with distinction at Oxford, became a Benedictine monk at Durham, and was made tutor to Edward

of Windsor, afterwards Edward III., by whom in after-years numerous honours were bestowed upon him. In 1333 he was appointed Dean of Wells, and in the same year was made Bishop of Durham by the pope at the king's request, despite the fact of the monks having elected their sub-prior, Robert de Graystanes. After holding the office of high chancellor for a year, he resigned it in 1335 to act as the king's ambassador in Paris, Hainault, and Germany. In 1337 he was employed as a commissioner for the affairs of Scotland, and in 1342 he arranged a truce with the Scottish king. He died in 1345. Richard administered the affairs of his diocese with ability, as appears from his chancery rolls, which are the earliest preserved in the archives of Durham. An admirable ecclesiastic, he was kind and charitable to the poor. But he is chiefly known as a scholar and patron of learning, and he used his high offices of state to gratify his passion for discovering manuscripts and collecting books. His principal work, *Philobiblon*, was intended to serve as a handbook to the library which he founded in connection with Durham College at Oxford (afterwards suppressed). It gives an interesting account of how he collected his library, describes the state of learning in England and France, and closes with an explanation of the rules for the management of his library, which were founded on those adopted for the library of the Sorbonne. He had wide literary sympathies, commended the study of the poets, and provided his library with Greek and Hebrew grammars. At the dissolution of the monasteries, books of his went partly to the Bodleian, partly to Balliol, and partly to the purchaser of Durham College.

Aurangabad, Aurangzeb. See AURUNGABAD, AURUNGZEBE.

Aurantioideæ (from late Lat. *aurantium*, 'an orange'), a subdivision of the Rutaceæ which some would make a separate family, are trees and shrubs, often of great beauty. There are about one hundred known species, natives of warm climates, and almost all of the East Indies, but now largely diffused by cultivation. The species of the genus Citrus are the best known, among which are the orange, lemon, citron, &c. But many other genera produce agreeable fruits, among which the Bael-fruit (*Ægle Marmelos*) and the Wampi (*Clausena Wampi*) deserve particular notice. The fruits, ripe and unripe, juice and rind, the flowers, leaves, bark, &c. of a number of species are employed medicinally, their properties being largely due to the fragrant volatile oil, which abounds especially in the leaves and the rind of the fruit. See ÆGLE, CITRON, LEMON, LIME, ORANGE, SHADDOCK.

Auray, a port in the French department of Morbihan, 20 miles E. of Lorient by rail, with oyster fisheries. Pop. 6500. Here is a large deaf and dumb institute; and 2 miles north is the famous place of pilgrimage of St Anne of Auray, with a fine church completed in 1877.

Aure'lia. See CHRYSALIS.

Aurelia'nus, LUCIUS DOMITIUS—also named CLAUDIUS DOMITIUS and VALERIUS—one of the most powerful of the Roman emperors, was of very humble origin, his father having been a husbandman. He was born in Dacia or Pannonia about 212 A.D., and enlisting early as a common soldier, he rapidly distinguished himself, and held the highest military offices under Valerianus and Claudius II. On the death of Claudius (270), Aurelian was elected emperor by the army, with whom his great stature, strength, and courage had made him very popular. He commenced his reign by repulsing the barbarian Alemanni and Marcomanni, and then proceeded to erect a new line of fortified walls round Rome, the ruins of which may still be traced. Finding that the province of Dacia could not be maintained against the assaults of the Goths, he surrendered it on certain conditions, and strengthened the frontier of the Roman empire by making the Danube its boundary. He next turned his attention to the East, where the renowned queen, Zenobia (q.v.), had extended her sway from Syria to Asia Minor and Egypt. Aurelian defeated her in two battles, and besieged her in Palmyra, from which she attempted to escape when she saw defence would prove unavailing. She was, however, taken prisoner, and soon after the city surrendered, and was treated leniently. Shortly after he had departed, a new insurrection took place. He returned in 273, and gave the splendid city up to destruction. Aurelian was again called to the East by a rebellion in Egypt, instigated by Firmus, a merchant of great influence, which he speedily quelled. In Gaul, Tetricus, who had held imperial power since before the death of Gallienus, finding himself unable to wield it, surrendered it to Aurelian. By restoring good discipline in the army, order in domestic affairs, and political unity to the Roman dominions, this prince merited the title awarded to him by the senate—'Restorer of the Roman Empire.' He was assassinated at the instigation of a faithless secretary, between Heraclea and Byzantium, during his campaign against the Persians (275).

Aurelius. MARCUS AURELIUS ANTONINUS, the best of the Roman emperors, and one of the noblest figures in history, was the son of Annius Verus and Domitia Calvilla, and was born at Rome on the 26th of April 121 A.D. His original name was Marcus Annius Verus. On the death of his father, he was adopted by his grandfather, who spared no pains to render him pre-eminent in every art and science. His fine qualities early attracted the notice of the Emperor Hadrian, who, playing on the boy's paternal name of Verus, used to call him *Verissimus* ('the most true'), and who conferred high honours on him while yet a child. When only seventeen years of age, he was adopted, along with L. Ceionius Commodus, by Antoninus Pius, who had succeeded Hadrian; and Faustina, the daughter of Pius, was selected for his wife. In the year 140 A.D. he was made consul; and from this period to the death of Pius in 161, he continued to discharge his public duties with the greatest promptitude and fidelity, while he maintained relations with the emperor of the warmest and most friendly kind. On his accession to the throne, with characteristic magnanimity he voluntarily divided the government with his adopted brother, young Commodus, called since his adoption Lucius Aurelius Verus. As the latter excelled in manly exercises, Aurelius determined to intrust to him the management of war. Towards the close of 161, the Parthian war broke out, and Verus was sent to quell it; but he proved himself completely incompetent, and only the ability of his generals, especially Avidius Cassius, saved the Romans from disaster. Verus on his return enjoyed a triumph to which he had no real claim; for all the victories had been won by others while he was revelling in the most extravagant licentiousness. Meanwhile clouds were forming on the horizon elsewhere. A formidable insurrection had long been preparing in the German provinces; the Britons were on the point of revolt, and the Catti waiting for an opportunity to devastate the Rhenish provinces. Within Rome itself a pestilence began to rage, believed to have been brought home by the troops of Verus; while frightful inundations and earthquakes laid large portions of the city in ruins, destroyed the granaries in which were kept

the supplies of corn, and thus created widespread famine and distress, adding to the terror which the citizens entertained of their savage enemies. Aurelius now resolved to lead his legions to the war himself. He was completely successful. The Marcomanni, and the other rebellious tribes inhabiting the country between Illyria and the sources of the Danube, were humbled, and compelled to sue for peace in 168; a year later Verus died. The contest was renewed two years afterwards, and the emperor was obliged to make up for the ravages of plague among his soldiers by enlisting vast numbers of gladiators and slaves. He made Pannonia his headquarters, and drove out the Marcomanni, whom he subsequently all but annihilated in crossing the Danube. The most famous victory of the war was that gained over the Quadi in 174 A.D., which was attributed by the Christians to an answer to the prayers of some soldiers of their faith in what afterwards became known as the 'Thundering Legion.' It is certain that a signal deliverance did save the army from disaster. Entangled in a defile, and under a broiling sun, the soldiers were ready to perish from thirst and fatigue, when suddenly the cloudless sky darkened, and heavy showers of rain fell, which they caught eagerly in their helmets. While they were thus engaged, the enemy attacked, and would have cut them to pieces had not a blinding storm of hail and lightning fallen immediately on their faces. But this deliverance was ascribed by the Romans to the prayers of the emperor himself, and it is certain that the title in question had belonged to a particular legion since the time of Augustus. The effect of this remarkable victory was instantaneously and widely felt. The Germanic tribes hurried from all quarters to make their submission, and obtain clemency. Hardly had the emperor had a moment's respite before he was summoned to the East by a rebellion of the ambitious governor, Avidius Cassius, who had seized the whole of Asia Minor. Before Aurelius arrived, the usurper had fallen by an assassin's hand. The emperor's conduct on hearing of his enemy's death was worthy of the sublime virtue of his character. He lamented that the Fates had not granted him his fondest wish—to have freely pardoned the man who had so basely conspired against his happiness. On his arrival in the East, he exhibited the same illustrious magnanimity. He burned the papers of Cassius without reading them, so that he might not be tempted to suspect any as traitors; treated the provinces which had rebelled with extreme gentleness; and disarmed the enmity and dispelled the fears of the nobles who had openly favoured his insurgent lieutenant. While pursuing his work of restoring tranquillity, his wife Faustina died in an obscure village at the foot of Mount Taurus; and her husband, though he could scarcely have been unconscious of her unworthiness, paid the most lavish honours to her memory.

On his way home he visited Lower Egypt and Greece, displaying everywhere the greatest solicitude for the welfare of his vast empire. At Athens, which this imperial pagan philosopher must have venerated as a pious Jew venerates Jerusalem, he showed a catholicity of intellect worthy of his great heart, by founding chairs of philosophy for each of the four chief sects—Platonic, Stoic, Peripatetic, and Epicurean. No man ever laboured more earnestly to make that heathen faith which he loved so well, and that heathen philosophy which he believed in so truly, a vital and dominant reality. Towards the close of the year 176, he reached Italy, and celebrated his merciful and bloodless triumph. In the succeeding autumn he departed for Germany, where fresh disturbances had broken out among the restless and volatile barbarians. Victory again crowned his arms; but his constitution, never robust, and now shattered by perpetual anxiety and fatigue, at length gave way, and he died either at Vienna or at Sirmium, on the 17th of March 180, in the fifty-ninth year of his age, and the twentieth of his reign.

Marcus Aurelius was the flower of the Stoic philosophy. It seems almost inexplicable that so harsh and crabbed a system should have produced as pure and gentle an example of humanity as the records of either pagan or Christian history can show. In him stoicism loses all its haughty self-assertion, and is replaced by a humility that is usually regarded as the most peculiar, if almost the rarest, of the Christian graces. His youth was marked by the same lofty virtue as his maturer life. Already at twelve years of age the young philosopher was an avowed follower of Zeno and Epictetus. The Stoics, Diognetus, Apollonius, and Junius Rusticus, were his teachers, and he himself must be considered one of the most thoughtful teachers of the school. Oratory he studied under Herodes Atticus and Cornelius Fronto. His love of learning was insatiable. Even after he had attained to the highest dignity of the state, he did not disdain to attend the school of Sextus of Chæronea, a grandson of the celebrated Plutarch. Men of letters were his most intimate friends, and received the highest honours both when alive and dead. His own range of studies was extensive, embracing morals, metaphysics, mathematics, jurisprudence, music, poetry, and painting. There are few books that have had such a potent charm over so many hearts as the sad *Meditations* of Aurelius. His sentences reveal the loneliness of his soul, but they show us that he did not suffer himself to be embittered as well as saddened by his experience of life. A kind of self-revelation, marked by a penetrating insight, they reveal the rare serenity and elevation of his heart, and its rarer tenderness and pity. We must not forget that he did not cultivate philosophy merely in the spring-time of his life, when enthusiasm was strong, and experience had not saddened his thoughts, and when study was his only labour, but during the tumults of perpetual war, and the distraction necessarily arising from the government of so vast an empire. The man who loved peace with his whole soul died without beholding it, and yet the everlasting presence of war never tempted him to sink into a mere warrior. He maintained uncorrupted to the end of his noble life his philosophic and philanthropic aspirations. After his decease, which was felt to be a national calamity, every Roman citizen, and many others in distant portions of the empire, procured an image or statue of him, which more than a hundred years after was still found among their household gods. He became almost an object of worship, and was believed to appear in dreams, like the saints of subsequent Christian ages.

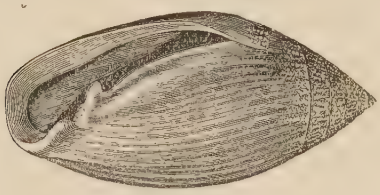
Aurelius twice persecuted the Christians: in the first persecution (166) Polycarp perished; in the second (177), Irenæus. Many have found it difficult to understand how a mind of such lofty virtue should have consented to the persecution of Christianity. The explanation is to be found in that very earnestness with which he clung to the old faith of his ancestors. He believed it to be true, and to be the parent of those philosophies which had sprung up out of the same soil; he saw that a new religion, the character of which had been assiduously, though perhaps unconsciously, misrepresented to him, both as an immoral superstition and a mysterious political conspiracy, was secretly spreading throughout the empire, and that it would hold no commerce with the older religion, but condemned it, generally in the strongest terms.

The *Meditations* were written in Greek, solely for personal purposes; their doubts, aspirations, perpendings of the problems of life, rather sad than serene, though expressing the mind of an ancient Roman philosopher, come wonderfully near the heart and conscience of modern Christians. Of this famous work Rendall says: 'For nine centuries no note or whisper betrays its existence; fourteen hundred years after they were written down the *Thoughts* re-emerge, a revelation of a personality without parallel in Greek or Roman literature.' The first edition of the text was by Xylander (Zurich, 1558), the next by Casaubon (1643); another, long the standard, by the English Puritan Gataker (1652). The chief English translations are by Jeremy Collier (1701), George Long (1869), Dr G. H. Rendall (*Marcus Aurelius Antoninus to Himself*, 1898), and Haines (1916). See studies by Bussell (1910), H. D. Sedgwick (1921), Rendall's introduction, Renan's *Marc Aurèle* (1882), the Life by Watson (N.Y. 1884), Farrar's *Seekers after God* (1868), Matthew Arnold's *Essays in Criticism* (1888), and Dill's *Roman Society* (1905).

Aureole. See NIMBUS, ANTHELIA.

Aurich, a town in the Prussian province of Hanover, 16 miles NE. of Emden; pop. 6000.

Auric'ula, a genus, and **Auriculidæ,** a family of Gasteropod Mollusca (Lat. *auricula,* 'a little



Auricula.

ear'). They have a spiral shell, covered with a horny epidermis, the first whorl very large and the spire short, the lip elongated, thickened, and toothed. The respiratory organ, or 'lung,' is a space below the mantle, on the walls of which the blood is exposed to the freely admitted air. They thus belong to the Pulmonate order of Gasteropods—i.e. to the same order as the common snails, having respiratory organs adapted for breathing in air, though some of them are capable of subsisting for a considerable time in water. Some inhabit fresh-water marshes, while others prefer the vicinity of salt water. They generally belong to warm climates, and some of them attain a large size. *Auricula midæ*, a native of the East Indies, is known to shell-collectors by the name of Midas's Ear.

Auric'ula (*Primula Auricula*), a congener of the Primrose (q.v.), much cultivated in flower-gardens. The auricula has long been a florist's flower. It was highly esteemed by the Romans, and has, at least since the 17th century, received particular attention from the florists of England and Holland. It is one of those flowers the cultivation of which is often most successfully prosecuted in the little gardens of operatives near large towns. Lancashire is particularly famous for it.—The auricula has smooth, dark-green leaves, stems, and calyces, covered with a mealy powder. A similar fine dust appears also on the flowers, and adds much to their beauty. Hence it has earned the popular name of 'Dusty Miller.' The auricula is a native of the Alps and other mountains of the middle and south of Europe, and of sub-alpine situations in the same countries. It is found also on the Caucasus and the mountains of Syria; it grows in shady and moist places. In a wild state it has comparatively small flowers, of a simple yellow colour, on short stalks, forming an umbel of generally six or seven flowers, with the same delightful fragrance which aids so much to make it a favourite flower in cultivation. The leaves are used by the inhabitants of the Alps as a remedy for coughs.

By cultivation and selection the auricula has been brought to great beauty and splendour of colour. More than 1200 varieties were reckoned as early as 1850, and new ones are continually raised from seed. All shades and combinations of

Auricula (*Primula Auricula*).

yellow, maroon, and purple, usually disposed in concentric rings, are predominant; and English florists classify these into five main types, green-edged, white-edged, gray-edged, self-coloured, and alpines, the latter having the margin of two blended colours with a yellow centre. The mealiness of the flower differs much in different varieties. The auricula blooms in April and May, and often also a second time at the end of autumn, which adds to the charms of the flower-border, although it is to the first or proper flowering-season that the florist looks. It succeeds best in a rich light soil, and cultivators diligently prepare for it composts of various kinds, but in general consisting chiefly of fresh loamy soil, and of well-rotted horse or cow dung, often with the addition of a little sand. The finer varieties are always cultivated in pots, and require protection from severe weather in winter, and from wind and rain while flowering. They ought, however, previous to flowering, to stand in an airy, sunny situation. They are propagated by offsets, generally in the latter part of August. When it is proposed to raise the auricula from seed, care ought to be taken to select the finest flowers, which are encouraged to ripen their seeds by exposure to sun and air, hand-glasses being placed over them during heavy rains. The seed is sown either in autumn or spring, generally in boxes placed under shelter, or in a slight hot-bed. The more weakly plants are tended with particular care, as they are generally found to produce the finest flowers.

The name auricula is derived from *auris*, an ear, on account of a fancied resemblance of the leaf to the ears of an animal.

Auricular Confession. See CONFESSION.

Auric'ulate, in Botany, a term applied to leaves, stipules, &c. and signifying that they have at the base two small ear-like lobes.

Aurignacian. See STONE AGE.

Aurillac, capital of the French department of Cantal, on the right bank of the Jourdanne, 116 miles SW. of Clermont by rail. The town is mainly modern, but contains an old castle and two churches of the 14th and 15th centuries. Among its indus-

tries are tanning and printing, and it has a trade in horses, cattle, and cheese. Annual races are held there, and there are two mineral wells. Pope Sylvester II. was a native. Pop. 16,000.

Aurochs is properly the German name of the extinct species of wild ox, called by Cæsar *Urus* (q.v.). Recently the name has been erroneously used for the Bison (q.v.), found till 1919 in Lithuania.

Aurora, (1) an enterprising city of Illinois, on Fox River, at the junction of several railroads, 30 miles WSW. of Chicago. It has machine-shops, flour-mills, manufactories of woollens, cottons, corsets, silver ware, carriages, and extensive railroad workshops. Pop. (1920) 36,397.—(2) A city in Indiana, on the Ohio, 24 miles W. by S. of Cincinnati, with an extensive grain and hay trade. Pop. 4000.—(3) A lead and zinc mining city of Missouri, 31 miles SW. of Springfield. Pop. 9000.

Aurora, the Latin name corresponding to the Eōs of Greek Mythology, the goddess of the dawn. She was the daughter of Hyperion and Theia, and sister of Helios and Selene, and wife of the Titan Astræus, to whom she bore the winds, Argestes, Zephyrus, Boreas, Notus, as well as Hesperus, the morning-star. She was described as rising in the morning from her bed in the ocean, borne along on a chariot drawn by the divine steeds Lampus and Phaëthon, ascending the heavens, where she lifted with her 'rosy fingers' the curtain of night, and announced the arrival of Helios (the sun) or of day both to gods and men. Homer frequently describes Aurora as the goddess of day, and the tragic writers identified Aurora with *Hemera* (the day). She was represented as clothed in a rosy-yellow robe, with a star shining on her forehead, and a torch in her right hand. She carried off several mortal youths of great beauty, among them Orion, Cephalus, and Tithonus.

Auro'ra Borea'lis, or NORTHERN LIGHTS, the name given to the luminous phenomenon which is seen towards the north of the heavens by the inhabitants of the higher latitudes. During the winter of the northern hemisphere, the inhabitants of the arctic zone are without the light of the sun for months together, and their long dreary night is relieved by this beautiful meteor, which occurs with great frequency in these regions. Those who have explored the southern seas have seen the same phenomenon in the direction of the south pole, so that the term Polar Lights might be more appropriate than Northern Lights to designate the aurora. For the phenomenon as seen in the southern hemisphere, the name aurora australis is used. The appearance of the aurora borealis has been described by a great variety of observers in Northern Europe and in America, all of whom give substantially the same account of the manner in which the phenomenon takes place. It is briefly as follows: A dingy aspect of the sky in the direction of the north is generally the precursor of the aurora; and this gradually becomes darker in colour, and assumes the form of a circular segment, surrounded by a luminous arch, and each end approaching near to the horizon. This *dark segment*, as it is called, has the appearance of a thick cloud, and is frequently seen as such in the fading twilight before the development of the auroral light. Its density must, however, be very small, as stars are sometimes seen shining brightly through it. This dark segment is bounded by a continuous luminous *arch* of a transparent white with a touch of green, which varies in breadth from 1 to 6 diameters of the moon, having the lower edge sharply defined, and the upper edge only when the breadth of the arch is small. This arch may be considered to be a part of a luminous ring elevated at a considerable distance above the earth's surface, and having its summit in most cases nearly in the magnetic meridian. An observer several degrees south of this auroral ring would see towards the north only a small arc of it, the larger part being hid by the earth; to one situated not so far south, it would appear as a larger and higher arch; to one placed below it, it would be seen as an arch passing through the zenith; and to one situated within the ring and farther north, it would be found as an arch culminating in the south. On this supposition nearly all the various positions of the auroral arch may be accounted for. The centre of the ring corresponds probably with the magnetic north, which is at present situated in the island of Boothia Felix. Hence it is that in Greenland, which is situated to the east of this island, the auroral arch has been seen stretching from north to south with its highest point in the west. The luminous arch, once formed, may remain visible for several hours, and is in a constant state of motion. It rises and falls, extends towards the east and towards the west, and breaks sometimes in one part, sometimes in another. These motions become all the more observable when the arch is about to shoot forth *rays;* then it becomes luminous at one point, eats in upon the dark segment, and a ray of similar brightness to the arch mounts with the rapidity of lightning towards the zenith. The ray seldom keeps the same form for any length of time; but undergoes continual changes, moving eastward and westward, and fluttering like a ribbon agitated by the wind. After some time it gradually fades in brightness, and at last gives way to other rays. When the rays are very bright, they sometimes assume a green, sometimes a violet, a purple, or a rose colour, giving to the whole a variegated and brilliant effect. When the rays darted by the luminous arch are numerous and of great length, they culminate in a point which is situated in the prolongation of the dipping-needle, somewhat south-east of the zenith. There they form what is called the *Boreal Crown;* and the whole heavens, towards the east, west, and north, present the appearance of a vast cupola of fire, supported by columns of variously coloured light. When the rays begin to be darted less brilliantly, the crown first disappears, then, here and there, the light becomes faint and intermittent, till at last the whole phenomenon fades from the sky.

The preceding description indicates the general features of the appearance of the aurora borealis; but several auroras have been described which presented striking peculiarities. Sometimes the phenomenon assumed the form of one or more curtains of light, depending from dingy clouds, whose folds were agitated to and fro, as if by the wind. Sometimes this curtain seemed to consist of separate ribbons of light, arranged side by side in groups of different lengths, and attaining their greatest brilliancy at the lower edges. In this country it is only on rare occasions, such as in 1870, that the aurora borealis occurs with the brilliancy which attends it in northern latitudes, but this description portrays the type to which such appearance of the meteor more or less approximates.

The height of the aurora has been variously estimated. The first observers were inclined to place the seat of it beyond the atmosphere; but this hypothesis is untenable, as the aurora does not seem to be affected by the rotation of the earth, but appears to be in every respect a terrestrial phenomenon. By taking observations of the altitude of the highest point of the arch of the same aurora at different stations, the heights most generally are from about 45 to 100 miles. Some authors have assigned heights as low as 5 miles, and others as high as 500 miles and even higher, but the results of recent research are not confirmatory of these

extremes. The distance of the stations at which the same aurora has been visible, indicates the enormous geographical extent, and likewise the great altitude which the phenomenon frequently attains. One aurora, for instance—that which occurred on the 25th October 1870—was seen over a large portion of the northern hemisphere, and at the same time *auroræ* were seen at many places in

Aurora Borealis.

the southern hemisphere. Dr Sophus Tromholt, who carried out a series of investigations on the subject of the aurora borealis in the extreme north of Norway, states that the light of the aurora is never serviceable to people in their work; its contribution to lighten the darkness is almost *nil;* the momentary flashes of real luminosity are very brief and of no practical value.

The noise that is alleged to accompany the aurora borealis in high latitudes would indicate for it a comparatively moderate height; but we can scarcely yet be said to be in possession of indisputable instances of its being heard by competent observers. See the subject discussed in communications to *Nature*, especially one by Tromholt in vol. xxxii. p. 499.

The intimate connection between the aurora borealis and the magnetism of the earth is shown by various facts. During the occurrence of the phenomenon, the magnetic needle appears very much disturbed, sometimes deviating several degrees from its normal position, and appearing to be most affected when the aurora is brightest; and this oscillation is frequently perceived far beyond the district where the aurora is seen. The vertex, likewise, of the luminous arch is almost always found to be in or very near the magnetic meridian, and the boreal crown has its seat in the prolongation of the freely suspended needle. There seems, moreover, to be a connection between the magnetic poles of the earth in regard to the aurora, for, as has been frequently ascertained, the meteor occurs simultaneously at both. The aurora borealis appears to be an electric discharge connected with magnetic disturbance. If one of Gassiot's vacuum tubes be brought near an electric machine, or between the poles of an induction coil, flashes of light pass between the ends, which bear a striking resemblance to the aurora borealis. A comparison of the spectra of the two goes far to establish identity.

The auroral spectral line, discovered by Ångström in 1867, is a yellow line near the sodium line, and is the same as the air line seen in the solar light when the sun is near the horizon. Other lines, however, have been seen, which cannot as yet be produced by the physicist from any known substance.

Lemström has shown by the observations and experiments he made at Sodankylä, that auroræ are due to currents of positive electricity illuminating the atmosphere in their passage to the earth. Luminous appearances accompanied the setting in of a current towards the earth from the network of insulated wires with which he overspread the top of Mount Oratunturi, *and this light was clearly auroral*, giving the hitherto emigmatical citron line of Ångström referred to above, which is the invariable constituent of auroral radiations. Other faint and indistinct lines are enumerated as present, and Lemström is of opinion that there is a tolerable agreement between some of these and the lines in the laboratory spectrum of rarefied air, but the whole subject demands further investigation.

Loomis and Fritz severally investigated the geographical distribution of the aurora borealis. The following woodcut is from Loomis, from which it is seen that the region of greatest auroral action is an oval-shaped zone surrounding the north pole, whose central line

Map showing the geographical distribution of the Aurora Borealis.

crosses the meridian of Washington in latitude 56°, and the meridian of St Petersburg in latitude 71°. It follows from this that auroræ are more frequent in North America than in the same

latitudes in Europe. Loomis points out that this auroral zone bears considerable resemblance to a magnetic parallel or line everywhere perpendicular to a magnetic meridian.

It is a fact of the greatest significance that as regards geographical distribution, auroræ and thunderstorms are complementary, auroræ being not more characteristically of polar than thunderstorms are of tropical origin. Auroræ are, however, subject to extremely complicated periodicities, indicating systematic magnetic associations; whereas thunderstorms may be regarded as completely dissociated from magnetic associations, and their periodicities are restricted to diurnal and annual variations.

The diurnal maximum of auroræ in middle latitudes, or on the equatorial side of this great auroral zone, shaded dark in the woodcut, occurs in the evening; but in Greenland and other regions on its polar side, the maximum occurs in the early morning. Further outside the auroral zone, there are two maxima in the year, one in spring and one in autumn, but at places inside this zone, the two maxima coalesce into a single maximum at the winter solstice. Thus, with an increase of solar heat, diurnal or annual, the auroral zone travels equatorwards, and with increased cold polewards; and it is extremely interesting to note that on the polar side a sunspot maximum is accompanied with auroral minimum, and the equatorial side with a maximum, thus supporting the idea that a sunspot maximum period is coincident with a maximum temperature. At the times when the solar heat is greatest evaporation is greatest, the supply of atmospheric electricity consequently more copious, increased tension brings about more speedy neutralisation, the zone of gradual recomposition travels towards the equator; and thus auroræ become more frequent in middle latitudes. See the handbooks of Meteorology, numerous articles and notes by Lemström and others in *Nature* (1882–87), Tromholt's *Under the Rays of the Aurora Borealis* (1885), and Angot's *The Aurora Borealis*.

Aurungabad, the name of at least four places in India. The most important is the headquarters of a like-named district in the state of Hyderabad, on the Doodna, a tributary of the Godavari. The population, once 100,000, was 36,876 in 1921. Its monuments of former grandeur are a palace, now in ruins, built by Aurungzebe when viceroy of the Deccan, and his daughter's mausoleum.

Aurungzebe (*Aurangzib*, 'Ornament of the Throne') was the most powerful of the Mogul emperors of India, the last who ruled with energy and effect. He was born in 1618, and was the third son of Shah-Jehan. He early cherished or professed profound religious zeal. In 1657 his father, who had previously promoted him to high civil and military offices in the state, in performing the duties of which he greatly distinguished himself, was seized with an illness from which he was not expected to recover. The reins of power were at once seized by his eldest son, Dara, who was unpopular with the orthodox Mohammedans, as being too liberal in his theological views. Of the brothers, Shuja was at that time governor of Bengal, Aurungzebe of the Deccan, and Murad of Guzerat. The first immediately took up arms. Aurungzebe's policy was to let the two fight it out, and exhaust each other, and then to play off his third brother against the victor. He conferred with Murad; assured him he had no earthly ambition; that the crown he strove for was a spiritual, and not a temporal one; and that, for affection's sake, and with a view to promote the interests of the true faith, he would support his pretensions to the throne. Murad believed him, and the forces of the two were joined. Meanwhile, Dara having overcome Shuja's army, directed his forces against his other two brothers; but Aurungzebe's plausibility prevailed over Dara's generals, who deserted, and Dara had to seek safety in flight. By this time, however, Shah-Jehan had somewhat recovered. Aurungzebe professed the utmost loyalty, but secretly gave his son instructions to take possession of Shah-Jehan's palace, which was done, and the aged monarch was made prisoner. Aurungzebe next seized and confined his too confiding brother, Murad; and after a struggle of two or three years' duration, Dara and Shuja also fell into his power, and all three were put to death. The sceptre was now firmly within the grasp of Aurungzebe. He professed not to care for the imperial insignia, but was ultimately induced to receive them in August 1658, assuming the title of Alamgír, 'Conqueror of the World,' and later, that of Mohi-eddín, 'the Reviver of Religion.' In the seventh year of Aurungzebe's reign, his father died, still in confinement.

Aurungzebe's long reign of half a century was distinguished by great outward prosperity, and has been represented as the most brilliant in Indian annals; but the empire was diseased at its heart. Everywhere there was distrust; the emperor, who had established his throne by fraud, was naturally enough distrusted by all. He lacked confidence in his statesmen, who, in their turn, distrusted him and one another. His sons imitated him in his disobedience to his father, and the Hindus, whom he treated with great harshness, excited the Mahrattas against him in the south. Still his great abilities sufficed during his reign not only to preserve his empire intact, but even to enlarge it considerably. Discord between the monarchs of Bijapur and Golconda enabled him to add these two kingdoms to his empire. But though some of the independent Mohammedan princes were subdued, the Hindu states were gathering strength for the overthrow of the Mogul power; and the seeds of decay which had been sown in his reign bore ample fruit in the reign of his son. His schemes had come to little good; most of his enterprises failed; and he may be said to have ruined the empire. His later years were passed in the fear of receiving the measure he had meted to others, and he died, a fugitive before the Mahrattas, at Ahmednagar, in February 1707. See Stanley Lane-Poole's *Aurangzib* (1893), and J. N. Sarkar's (1912–16; new ed. 1920).

Auscultation (Lat. *auscultare*, 'to listen'), a mode of detecting diseases, especially those of the heart and lungs, by listening to the sounds produced in the cavity of the chest. This is done either by the unassisted ear (*immediate* auscultation), or by the aid of a simple sound-conveying instrument, the stethoscope (*mediate* auscultation). By care and attention, the normal sounds produced by respiration and the beating of the heart may be distinguished from the several abnormal sounds indicating disease. Developed into a scientific method by Laennec (q.v.), auscultation is classed among the most important of discoveries in modern medical science. See DIAGNOSIS, PERCUSSION, RESPIRATION, STETHOSCOPE.

Ausonius, DECIUS MAGNUS, the most conspicuous Roman poet in the 4th century, was born at Burdigala (Bordeaux), about 309 A.D. Early distinguished for his eloquence, he was appointed by Valentinian tutor to his son Gratian; and he afterwards held the offices of quæstor, prefect of Latium, and consul of Gaul (379 A.D.). On the death of Gratian, Ausonius retired from public life to his estate at Bordeaux, where he occupied himself with literature and rural pursuits until the time of his death (392). T+

is most probable that Ausonius was a Christian, though the question has occasioned much controversy, and is perhaps made all the more uncertain by the impurity of his writings. His works include a collection of 150 epigrams, poems on his deceased relatives (*Parentalia*), and on his colleagues (*Commemoratio Professorum Burdigalensium*), epistles in verse and prose, and 20 so-called idyls, of which the tenth, *Mosella*, a description of a journey on the Rhine and Moselle, is perhaps the happiest of all his poems. Ausonius is but a poor poet, though he occasionally displays a certain neatness and grace of expression. See Peiper's edition (1886), and White's (1919–21), with translation.

Auspices. See AUGURIES.

Aussee, a health-resort in the Styrian Salzkammergut on the Traun, 22 miles SE. of Ischl, and 2171 feet above the level of the sea, with salt-baths and salt-works.

Aussig (Czech *Ustí*), a town in northern Bohemia, on the left bank of the Elbe, 66 miles NNW. of Prague, with large chemical-works, and manufactories of machinery, glass, pottery, woollens, and cottons; pop. 40,000. Raphael Mengs was born here.

Austen, JANE, was born 16th December 1775, at Steventon Rectory, near Basingstoke in Hampshire, the seventh of eight children. Her father, the Rev. George Austen, was a competent scholar, who carefully cherished his daughter's talent; he was regarded by the villagers as a sort of deputy-squire for his relative Mr Knight. Her mother, Cassandra Leigh, came of a family of wits. Of her six brothers, James and Henry (who had been a militia officer, and failed as a banker in London) succeeded their father as rectors of Steventon. Edward, adopted by the Knights, assumed their name on inheriting their large estates in Kent and Hants. Francis and Charles became admirals. Her sister Cassandra remained in the closest possible relations with her all her life. Though Jane Austen has no claim to be called learned, her education was better than that which most girls got towards the close of the 18th century; she learnt French and Italian, and had a good acquaintance with English literature, her favourite authors being Richardson, Johnson, Cowper, Crabbe, Fanny Burney, and Scott. In 1801 the family settled at Bath, and after the father's death there in 1805, the widow and two daughters removed (1806) to Southampton, and in 1809 to the village of Chawton (Edward Knight's property) near Alton. These removals, with school at Reading, and visits to her brothers and to Bath and Lyme, practically complete the tale of her travels. Early in 1816 her health began to give way. In May 1817 she found it necessary to remove to Winchester, for the sake of good medical advice, and she died there on the 18th of July 1817, her forty-two years of placid existence having been almost undisturbed by any but the gentler emotions. Her mode of life was that of the characters in her novels. She was a good needlewoman; sang and played passably, but was apparently no great musician; was exceedingly fond of dancing; a shrewd, vivacious, and humorous letter-writer; a model aunt who delighted her nephews and nieces by improvising long stories. In the Steventon household there was much reading aloud of miscellaneous books of the day. The dining-room or a barn was sometimes turned into a theatre. Slow to publish, Jane Austen began to write at a very early age. Her tales, mostly ludicrous, 'had amounted to a considerable number by the time she was sixteen.' *Love and Freindship* (such is the spelling), published with other juvenilia in 1922, is of this time. A 'rattling burlesque' of feckless fainting heroines and persecuted lovers, it exhibits her characteristics in astounding maturity. Like *Lady Susan* (1925) and other early writings it is in the form of letters, no doubt after the example of Richardson. At the age of twenty-one she began what is generally considered her best novel, *Pride and Prejudice;* but it cannot, as we have it, be considered early work. Publishers were loth, she herself fastidious and assiduous in revision, and all her works late in appearing. *Sense and Sensibility* 'by a Lady' was the first published (1811); *Pride and Prejudice* followed in 1813. *Northanger Abbey* was begun about 1798, and published posthumously in 1818. Apart from the fragment written about 1804, to which Mr J. E. Austen-Leigh gave the title of *The Watsons*, her work thenceforward seems to have been limited to revision until 1812, when she began *Mansfield Park*. It appeared in 1814, and its successor *Emma* in 1816. *Persuasion*, completed in July 1816, was published in 1818. A novel begun in 1817, and left unfinished, was published as *Sanditon* in 1925. The novels were written in the sitting-room at Steventon or Chawton. When a creaking door gave warning that a visitor not in the secret was approaching, a cover was hastily thrown over the manuscript.

Successor to Samuel Richardson and Fanny Burney, Jane Austen created the most characteristic type of the pure domestic novel. She drew her material from what she actually saw around her; her experience of life was limited, even monotonous. This and her own temperament determined her to a kind of novel-writing completely opposed to the *Udolpho* and *Monk* type then in vogue. *Northanger Abbey* is a deliberate parody of this style, though it is only intermittently parody; and it was unquestionably her conscious conviction that a true picture of ordinary life could be made as interesting as the tale of blood-curdling horrors and overdrawn sentiment, of daggers and bowls, impossible disguises, incredible conjunctions, monstrous crimes, preternatural agonies and remorse. Incident is rare: romance is avoided. There is no attempt to startle with scenes of surprising daring or distress. She sets us down in country-house and cottage of gentility, and introduces us to an entertaining company who unconsciously lay bare their characters amid the ordinary incidents of daily life, and in marvellously lifelike and mercilessly revealing conversations. The details all aid in developing and discriminating her characters, who, if they do not throb and thrill with passion, have amazing vitality; they are presented with extraordinary dramatic truth and effect; 'every one says the right thing in the right place and in the right way.' 'Of all his successors she is the one who most nearly resembles Richardson in the power of impressing reality upon her characters.' She is amazingly deft in delicate ridicule of foibles and vanity. We do not find, we do not miss that morbid colouring of the stronger and darker passions which so many novelists of her time affected. The clear daylight of nature as reflected in domestic life is her genial and inexhaustible element.

As her genius was precocious, so it remained steady. Her style is throughout natural, quietly epigrammatic, unfailingly telling; her humour and insight sleepless, merciless, and yet kindly and free from all bitterness; her artistic sense sure. Hence there is not one of the six novels—unless it be *Sense and Sensibility*—that some readers do not consider her best. Witty brilliancy commends *Pride and Prejudice* most to some; exuberant high spirits *Northanger Abbey* to others. One critic points to the pure ironical humour of *Emma;* a second finds in *Persuasion* a ripening into a more mellow manner. Had she written fifty novels,

there would doubtless have been fifty opinions. Sir Walter Scott, after reading *Pride and Prejudice* for the third time, thus summed up Jane Austen in his diary with the authority of a master and with an unforgettable contrast: 'That young lady has a talent for describing the involvements of feelings and characters of ordinary life, which is to me the most wonderful I ever met with. The big *bow-wow* strain I can do myself like any now going; but the exquisite touch which renders ordinary commonplace things and characters interesting from the truth of the description and the sentiment, is denied to me. What a pity such a gifted creature died so early!' Macaulay wrote: 'I have now read once again all Miss Austen's novels; charming they are. There are in the world no compositions which approach nearer to perfection;' and declared that she approached nearest to Shakespeare in character-drawing—an opinion in which many others have followed him. Coleridge, Southey, and Sydney Smith were amongst her admirers, a representative trio. But none knew her literary character better than she did herself. Hers is 'the little bit (two inches wide) of ivory on which I work with so fine a brush as produces little effect after much labour.'

See her brother Henry Austen's preface to *Northanger Abbey* (1818); the memoir by her nephew J. E. Austen-Leigh, son of James Austen (1870; 2d ed. with *Lady Susan* and fragments, 1871; ed. Chapman, 1927), mostly incorporated in *Jane Austen, her Life and Letters*, by his son and grandson, W. and R. A. Austen-Leigh (1913); the *Letters* edited by Lord Brabourne, son of her niece, Fanny Knight (1884); reviews in the *Quarterly* by Walter Scott (1815, actually 1816) and Whately (1821); the Life by Oscar Fay Adams (1891); an essay by A. C. Bradley (*Essays and Studies of the English Association*, ii. 1911); *Personal Aspects of Jane Austen*, by Mary A. Austen-Leigh (1920); L. Villard, *Jane Austen* (trans. 1923); and R. W. Chapman's editions of the novels (1923, 1926).

Austerlitz, a small town in Moravia, 12 miles ESE. of Brünn. Here, on 2d December 1805, Napoleon defeated the combined forces of Russia and Austria, under the command of their respective emperors. The French amounted to 70,000 men; the allied armies to 95,000. In this disastrous battle—known as the 'battle of the three emperors'—the Russians lost 21,000 in killed, wounded, and prisoners, the Austrians 6000, and the French 6800. See Rose's *Napoleonic Studies* (1904).

Austin, capital of Texas, on the left bank of the Colorado River, at the junction of several railroads, 166 miles W. by N. of Houston. The river breaks through a range of hills upon which the city is built. The red granite State Capitol (1881–88), for the expenses of which three million acres of land were appropriated, is the largest State Capitol in the Union, and is reputed one of the largest buildings in the world. Austin also contains the State University (1883), banks, state asylums, &c., and has a miscellaneous trade. It was named after Stephen Fuller Austin (q.v.). Pop. 35,000.

Austin, ALFRED, critic, journalist, and poet-laureate (in succession to Tennyson), born of Catholic parents at Headingley near Leeds, May 30, 1835. He was educated at Stonyhurst and St Mary's College, Oscott, graduated at the university of London in 1853, and was called to the bar in 1857. He soon turned to literature for a living. His first work was *Randolph* (1854), an anonymous poem full of sympathy for the Poles; but his first important book was *The Season: a Satire* (1861), which was so severely criticised, that its author felt it necessary to reply in *My Satire and its Censors* (1861). *The Human Tragedy* (1862) he soon recalled, but did not issue it in its altered form till 1876. Later volumes of verse are *Interludes* (1862); *Savonarola*, a tragedy (1881); *Soliloquies in Song* (1882); *At the Gate of the Convent* (1885); *Love's Widowhood* (1889); *Narrative Poems* (1891); *England's Darling* (1896); *The Conversion of Winckelmann* (1897). *The Garden that I Love* (1894), *In Veronica's Garden*, *Lamia's Winter Quarters*, *Haunts of Ancient Peace*, and *A Lesson in Harmony* (1901) are mainly in prose. In 1883–93 editor of the *National Review*, he twice stood unsuccessfully for parliament. In 1896 he was appointed poet-laureate. His *Autobiography* (1911) made mention of 18 volumes of verse and 7 of prose, besides journalistic and magazine work. He died 2d June 1913.

Austin, JOHN, was born at Creeting Mill, Suffolk, 3d March 1790; served in the army; but in 1818 was called to the bar. In 1820 he married Sarah Taylor of Norwich (see below), and went to live in Westminster. Compelled by bad health to abandon the bar when the university of London was founded (1826), he received the appointment of professor of Jurisprudence. To fit himself for the chair, he settled in 1827 at Bonn, and returned to England next year well acquainted with the writings of some of the most eminent of the continental jurists. His lectures were well received by a few distinguished men; but the subject was not recognised as a necessary branch of legal study. In the absence of students, Austin in 1832 was reluctantly compelled to resign his appointment. In the same year, he published his *Province of Jurisprudence Determined*, a work at the time little appreciated by the general public; in the estimation of competent judges, however, it placed its author in the highest rank among writers on jurisprudence. It dealt with the relations of ethics to law, and gave an admirable statement of utilitarianism, on which he based his system of morals. In 1833 he was appointed by Lord Brougham a member of the Criminal Law Commission. The post was not much to his taste, as he did not believe that the public received any advantage from such bodies. 'If they would give me £200 a year,' he said, 'for two years, I would shut myself up in a garret, and at the end of that time I would produce a complete map of the whole field of crime, and a draft of a criminal code.' Austin was afterwards appointed a member of a commission to inquire into the grievances of the Maltese. He returned to England in 1838, not in good health, and soon removed with his family to Germany, living at Carlsbad in summer, at Dresden and Berlin in winter. The revolution of 1848 drove him back to England, and he then settled at Weybridge, where he died in December 1859, universally respected for the dignity and magnanimity of his character. His lectures on the principles of jurisprudence were prepared for the press by his widow, and published after his death under the title of *Lectures on Jurisprudence* (1861–63). They and the earlier works, edited together by Mr R. Campbell, have passed through several editions.

Austin's great merit consists in his having been the first English writer who attached precise and intelligible meaning to the terms which denote the leading conceptions underlying all systems of jurisprudence. With a very perfect knowledge of the methods of Roman and English law, he displayed genius of the highest order in devising a novel system of classification for the subject-matter of his science. The work he did is incomplete, but it forms a sure foundation to future labourers in the same field. It is universally recognised as an enduring monument of learning and genius, and it entitles its author to take rank as one of the very few Englishmen who have made contributions of importance to the philosophical study of law. Austin said of himself that his

special vocation was that of 'untying knots'—intellectual knots; and so it was. He set himself to the task of exposing the errors hid under the phrases and metaphors current among writers on law, and this he accomplished with such skill and subtlety as to make his works models of close and sound reasoning. See Memoir of Austin prefixed to the *Lectures*, and an article on Austin in Mill's *Dissertations*.—Mrs Austin (*née* Sarah Taylor), translator, was born at Norwich in 1793, and married John Austin in 1820, the only child of the marriage being Lady Duff Gordon (q.v.) A faithful and devoted wife, she spent many years with her husband abroad, and enjoyed the friendship of many of the most eminent persons in continental society. Mrs Austin translated from the German, Falk's *Characteristics of Goethe* (1833), Carové's *Story without an End* (1834), Ranke's *Popes* (1840) and *History of the Reformation in Germany* (1845); from the French, M. Cousin's *Report on Public Education in Prussia* (1834), and Guizot's *English Revolution* (1850). She herself was author of a pamphlet *On National Education* (1839); of *Germany from 1760 to 1814* (1854); and of *Letters on Girls' Schools and on the Training of Working-women* (1857). From 1861 to 1863 she was engaged in editing her husband's lectures from his manuscripts, a duty she discharged with very great ability. She died at Weybridge, 8th August 1867.—Charles Austin, younger brother of John, was born in 1799, and educated at Bury and Jesus College, Cambridge. Called to the bar in 1827, and made a Queen's Counsel in 1841, he, during the railway mania, made an enormous fortune as a parliamentary lawyer, and in 1848 retired from practice. So this first of lawyers and most eloquent of Benthamites, Macaulay's rival as a conversationalist, who to Mill had seemed 'capable of dominating the world,' died, a country squire, at Brandeston Hall, in Suffolk, 21st December 1874.

Austin, Stephen Fuller, founder of the State of Texas, was the son of Moses Austin, a pioneer in the same region, and in 1821 conducted a party of settlers to where the city of Austin now stands, thus carrying out a work his father had begun (see Texas). In 1833 Austin went to the city of Mexico to secure the admission of his settlement into the Mexican Confederacy, and was imprisoned there till 1835. He died in December 1836.

Austin Friars. See Augustinians.

Australa'sia is a term etymologically equal to *Southern Asia*, but used to indicate Australia and the adjoining islands—Tasmania, New Zealand, Papua or New Guinea, New Caledonia, the New Hebrides, New Ireland, and New Britain. The term would thus exclude the Malay Archipelago, Micronesia and Polynesia proper; but some authors include these great groups of islands also, making the name therefore equivalent to *Oceania*. The 'Australasian Colonies,' however, in common parlance include only the Commonwealth of Australia and the Dominion of New Zealand. The several islands are discussed each under its own name; and for fauna and flora, see Geographical Distribution.

Australia, by far the largest island on the earth's surface (its size, indeed, almost entitles it to rank as a continent), lies between 10° 41′ and 39° 8′ S. lat., and between 113° 9′ and 153 39′ E. long., having a maximum length, from west to east (from Steep Point to Cape Byron), of about 2400 miles; and a maximum breadth, from north to south (from Cape York to Wilson's Promontory), of 1971 miles; making a total area of 2,948,366 sq. m. (excluding Tasmania, 26,215), about one-fourth less than that of Europe, or nearly twenty-five times that of Great Britain and Ireland. It is separated from New Guinea by Torres Strait, 90 miles wide, and from Tasmania by Bass Strait, 140 miles wide; on three sides it is washed by the Indian Ocean (now usually called the 'Southern' Ocean east of Cape Leeuwin), on the E. by the South Pacific. The distance from Southampton to its first port of call, Fremantle, is 9672 nautical miles *viâ* the Suez Canal and 10,670 *viâ* the Cape of Good Hope. From Sydney, the principal port on the eastern coast, London is distant 12,799 miles *viâ* Vancouver and 12,688 *viâ* the Panamá Canal.

The name Australia for this part of the earth's surface was first used by Captain Flinders in 1804, and formally adopted about 1817; but the word had already been used (to denote quite a different region) by Alexander Dalrymple in 1770, and the adjective 'Australian' was used in 1693 to denote inhabitants of the southern Pacific islands. For many years (up to 1849 at least) the mainland was officially known as New Holland, and 'Australia' was used to denote the British possession which included both the mainland and Tasmania.

The continent is exceedingly compact, with an almost unbroken outline on the east and west. Parallel with the east coast, at distances varying from 10 to 100 miles, stretches for 1200 miles the Great Barrier Reef, offering few safe openings for ships. From Moreton Bay in Queensland round by the north to North-west Cape in Western Australia, the encircling seas are comparatively shallow, as they are on the south between King George's Sound and Cape Howe; but along the east and west coasts the 1000-fathom line is not far from shore, and depths of 2500 to 3500 fathoms are found within 250 miles of the coast-line on the east, south, and north-west.

The lack of good river communication between the coast and the interior is remarkable. The mountains that rise to any great elevation are all on the east side; and but one important river, the Murray, penetrates the settled districts behind them, collecting into itself (by the Darling and other great tributaries) almost the whole inland drainage of that eastern range. The great rivers of the north and north-west traverse pastoral and but sparsely settled districts; and the minor ranges on the west side of the continent feed only a few short and often intermittent streams. A large expanse, between a narrow strip of occupied country on the west coast and the overland telegraph-line, seems to have no properly defined river-system. The lack of natural irrigation over this arid area is further aggravated by the enormous evaporation, which for long periods dries up such rivers as it possesses.

Physical Features.—The dominant physical feature of eastern Australia is the Dividing Range, which under many names runs almost parallel to the eastern coast from Cape York to Wilson's Promontory. 'Range,' however, is a misleading term; the area is really a wide tableland, often much dissected, with a steep face seawards and a long slow slope to the plains inland. In early geologic times its rivers seem to have flowed mainly north and south along its surface; but these older channels have in many cases been intercepted by those of short streams running east or west, leading (in the case of east-flowing rivers, fed by the plentiful coast rains) to deep excavation of the river-beds and the formation of the huge gorges so characteristic of Australian mountain scenery. Behind the tableland (which is about 200 miles wide in most places) lies a belt of alluvial plain, stretching from the Gulf of Carpentaria to the Southern Ocean, comparatively narrow (say 200 miles) in northern Queensland, but behind Brisbane extending over nearly 13 degrees of longitude. The rest of the continent, roughly speaking, is occupied by another

tableland, much less dissected because the rainfall is far scantier, which includes South and Western Australia and the Northern Territory; it throws out a tongue into western Queensland, and is invaded by a plain area at the head of the Great Australian Bight.

From the more or less complete dissection of the eastern tableland arise the 'ranges' and 'mountains' which diversify the map of Australia. The most important of them, both from its height and from its value as a source of water-supply, is the group of hills on the border of New South Wales and Victoria variously called the Muniong Range, the Bowen Mountains, and the Australian Alps. In it lies the highest Australian mountain (really one of several knobs on a high plateau), Mount Kosciusko (7328 feet), as well as several peaks of 6000 feet and over; and from it spring the head-waters or important tributaries of the Murray, Murrumbidgee, and Snowy rivers. A second high plateau occurs about the intersection of 30° S. lat., its highest point being Ben Lomond (5000 feet); the character of the 'range' may be guessed from the fact that a trunk railway line passes only 500 feet below the summit. In all the rest of the tableland only two hills exceed the 5000-feet level, and the average height is under 2000 feet. In the alluvial plain, especially in the New South Wales section, the map-marked 'ranges' are of a different kind, the remains of genuine fold-mountains almost buried in the result of their own denudation; they rarely rise beyond 1500 feet above sea-level, and about half that height above the plain. In the western tableland the only important range is the Macdonnell, in the centre of the continent; the Darling Range is merely the low western edge of the tableland, and the Mount Lofty Range in South Australia seems to be a genuine fold-range superposed on a plateau Along the seaward edge of the two tablelands occur long stretches of coastal plain, the alluvium of the eastern rivers, usually very fertile but awkward of access, which must be either by river-mouths blocked with bars or over the steep sides or spurs of the tableland. Australia's best natural harbours—Port Jackson, Port Curtis, Port Denison, and the like—are in regions where the tableland itself edges the sea, and therefore at some distance from the fertile districts; so that the transport of Australian products is doubly handicapped. Owing to peculiarities of soil-composition and climate, which will be discussed later, the settled area of the continent is almost wholly confined to its south-eastern portion—bounded, say, by a line from Rockhampton in Queensland through Forbes in New South Wales to Portland in western Victoria—and to districts adjacent to Adelaide in South Australia and Perth in Western Australia. The populational centre of gravity for the whole continent lies about half-way between Sydney and Adelaide.

The inland portion of this settled area is drained by the Murray and its tributaries, which comprise within their water-shed an area twice as large as France (more than 414,000 sq. miles). The Murray itself, rising in the Australian Alps on the border between New South Wales and Victoria, forms the boundary of those states until it passes from them into South Australia, and after a course of about 1600 miles loses itself in the shallow lagoon of Lake Alexandrina. On its southern or left bank it receives the northern drainage of the Victorian Highlands, its principal tributaries being the Goulburn (280 miles) and the Loddon (155). On its northern bank it receives the inland drainage of the great eastern tableland from as far north as 25° S. lat.—or rather what is left of that drainage after suffering enormous absorption and evaporation—through two channels, of the Murrumbidgee (1050 miles) and Darling (1760); the Murrumbidgee brings with it the waters of the Lachlan (850 miles), and the Darling those of the Macquarie (590), Castlereagh (340), Namoi (430), and Gwydir (350)—in wet seasons also those of the Bogan (370) and Warrego (495). The Darling itself is the product of two large rivers, one known in different parts of its course as the Barwon or Macintyre, the other as the Culgoa, Balonne, and Condamine. (This multiplication of names is a not uncommon feature of Australian hydrography.)

The coastal slopes of the tableland are drained, for the most part, by short swift rivers of no great length; but the already mentioned interception by some of these of older north-south rivers has produced a few large streams—the Shoalhaven, Hawkesbury, Hunter, and Clarence in New South Wales, and in Queensland the Fitzroy and Burdekin-Belyando. The head-waters of the last two penetrate the tableland almost to its western edge and the line of 20-inch rainfall, thus depriving the west-flowing rivers north of 25° S. lat. of a large permanent water-supply; the northern section, therefore, of the great alluvial plain has no rivers of great importance.

Practically the whole of the western tableland (except its coastal edge) has less than 20 inches of rain per annum. Its river-system is therefore extremely vague and indefinite. A few intermittent streams drain into the western extension of the plains at Lake Eyre; to the west of that lies an almost waterless tract, containing a few shallow lake-beds usually dry; but round the coast, from the Gulf of Carpentaria to Geraldton in Western Australia, large rivers cut deep into the tableland's edge and provide areas of good pastoral country, stretching in some places 300 miles inland. Of these the chief are the Roper (260) and Victoria (350) in North Australia, and the Ord (300), Fitzroy (325), Gascoyne (475), and Murchison (440) in Western Australia. The Perth district reverts to the east-coast type of tableland; but along the southern coast, from King George's Sound to Spencer Gulf, there is no seaward drainage worth considering.

Australian lakes, apart from a few small glacier-formed lakes in the Australian Alps, are either lagoons along the coast, with permanent or intermittent connection with the ocean, or large shallow depressions into which the inland streams pour their flood-waters. One of the latter—Lake George, in New South Wales—lies actually on the summit of the eastern tableland, in a region of steady rainfall, and dries only after periods of sustained drought; the others, whether on the alluvial plain (such as those lying along the Darling, and the great South Australian group) or on the western tableland, are more often dry than full.

Professor Sir T. W. E. David announced in 1921 that there are two main artesian basins in Australia—the smaller extending from a line Cloncurry-Hughenden (in Queensland) northwards to the Gulf of Carpentaria, the larger from Winton (Queensland) west to Lake Eyre. Underground circulation, which keeps the artesian water comparatively fresh, is maintained by a gigantic leakage towards Lake Eyre, which would form surface lakes but for the immense evaporation of central Australia. There are artesian possibilities in the Nullarbor Plains at the head of the Bight.

Geology.—This subject is treated in greater detail under the names of the different States. According to Professor Gregory, the general structure of the continent has been determined by the existence of two great blocks of Archæan rocks, the larger being the core of the western tableland already described, the smaller occurring in north-eastern Queensland. Against the larger, in middle Palæozoic times, more yielding strata were pressed

and folded into a series of ranges which ran from the Kimberley district, on the north-west coast, to the southern point of Tasmania; and these ranges, suffering denudation from the first, were in Cainozoic times also subjected to a good deal of faulting. To this faulting the different levels of the eastern tableland seem due, although its whole area from Cape York to Tasmania seems to have been uplifted at the same time. Roughly speaking, the eastern tableland at its southern end is composed of Ordovician and Silurian rocks on an Archæan base, which has been elevated through them at Mount Kosciusko. These extend northwards to the boundary between New South Wales and Queensland; under Sydney they drop 3000 feet and more to form a great basin in which the Permo-Carboniferous coal-fields were built up, and on either side of the New South Wales-Queensland boundary they hold in a shallower basin strata (including coal-seams) of Trias-Jura age. Thence northwards to lat. 21° Carboniferous formations predominate, abutting there on the Archæan rocks already mentioned. The great alluvial plains north of the Darling-Macquarie line are Cretaceous, south of it largely Eocene; round Cobar, in the north of the Tertiary area, occurs a much-worn plateau of Silurian and Devonian age. The western tableland is markedly Archæan, overlain in the Northern Territory and the Kimberley district by Cambrian and Ordovician strata, and at the head of the Bight by marine Cainozoic beds, largely limestones. Along its western edge occur Triassic and (north of 26°) Carboniferous beds; along its south-eastern edge, from near Lake Eyre to St Vincent's Gulf, lies a mass of rocks of Cambrian age.

Australia has no active volcanoes. But the evidences of past volcanic action are numerous and widespread. Along the southern edge of the eastern tableland, from Melbourne west across the South Australian border, extend the 'Newer' (Pliocene and later) Basalts, and extinct craters are plentiful, Mount Gambier being probably the best known. In New South Wales 'nearly every period belonging to the Palæozoic era had its active volcanoes; . . . in the Cainozoic era renewed activity took place; . . . the late Tertiary cones, although they have suffered considerable denudation, still remain as evidence of the great eruptions which produced them' (Süssmilch). In Queensland also the Tertiary outflows were extensive. In the western tableland the only considerable volcanic deposits occur in the Kimberley district and on the Victoria River; but there is a basalt outcrop at Bunbury on its south-western edge, and another on Kangaroo Island, south of Adelaide. Evidence is now also forthcoming of earlier (andesitic) flows in the area between the Murchison and De Grey rivers.

Although no part of the Australian continent is at present included within the permanent snow-line, there is adequate evidence of at least three glacial periods affecting its surface—a Pleistocene period, during which the whole of the Kosciusko plateau on the mainland and the west coast ranges of Tasmania were under ice; Permo-Carboniferous glaciations that affected central and northern Victoria, quite half of Tasmania, a large area in South Australia between the Murray River and Spencer Gulf (including the northern part of Kangaroo Island), part of the Hunter River valley in New South Wales, and a long stretch of coastal country in Western Australia between latitudes 23° and 29°; and a Cambrian period of which traces have been discovered only in South Australia, over an area of 90,000 square miles north and east of Adelaide. The evidence for these periods, most of which has been procured very recently, is set forth in the Commonwealth Official Year-book for 1920 (No. 13), on pp. 1133–46.

Minerals.—Gold is distributed through all the states, though very little is found in South Australia. The principal fields are in Western Australia, whence comes more than half the total yield of the Commonwealth. Diamonds of small size but commercial value are found in New South Wales, sapphires in Queensland, and topazes in the tin drifts of New South Wales and Tasmania; but the only gemstone which supports an important industry is the precious opal of the Cretaceous plains in western New South Wales and Queensland. The Permo-Carboniferous strata of New South Wales are the most important source of the Australian coal-supply. The coal-fields of that state cover an area of about 16,550 sq. m., and are estimated to contain an available supply of more than 115,000,000,000 tons; they include also extensive deposits of kerosene shale. Coal of commercial value (Jurassic) is worked in South Gippsland in Victoria, in which state deposits of brown coal and lignite also cover huge areas. Trias-Jura coal (black) is mined in southern Queensland; and in the central district along the Mackenzie and Dawson rivers Palæozoic seams occur, yielding good anthracite. Mines are also worked in Tasmania, and in the south-west corner of Western Australia. Queensland produces nearly half the copper of Australia, chiefly from the fields at Mount Morgan on the tableland and Cloncurry in the northern plain; New South Wales (Cobar) and Tasmania (Mount Lyell) are also large producers; the once famous fields of South Australia have now sunk into comparative insignificance, but account for nearly half the total yield since their first discovery. The silver-lead mines of Broken Hill in western New South Wales are among the most productive in the world; they have yielded over 104 million pounds' worth of silver and lead, and have paid away nearly £22,000,000 in dividends, while still producing at the rate of £5,000,000 worth of output a year. Tin (from northern New South Wales, north Queensland, and western Tasmania) and zinc (from Broken Hill) are also mined to the value of more than £1,000,000 a year in each case. Great deposits of iron exist in all the states, but little use has been made of them; however, the Commonwealth is encouraging the industry by a bounty, and foundries at Lithgow and Newcastle (New South Wales) are dealing with local ores from that state and from the Iron Knob in South Australia, near Port Augusta, where it is estimated that 21,000,000 tons are in sight. Other metals and minerals obtained in commercial quantity are antimony (New South Wales and Victoria), bismuth (Queensland), molybdenite (Queensland), salt (South Australia), scheelite (New South Wales), and wolfram (Queensland and New South Wales); New South Wales also has an important cement industry. Platinum, osmiridium, radium, tantalum, and uranium, as well as alunite and fuller's earth, are known in quantities that will probably repay serious development.

Climate.—Australia, lying mostly within the temperate zone, enjoys on the whole an equable climate, and is, latitude for latitude, cooler than the rest of the world. The extreme range of shade-temperature is, over the greater part of the continent, only 81°—half that of North America and northern Asia; while the 70° isotherm, which in South America and South Africa reaches lat. 33° S., in the Mediterranean about 35° N., and in Asia and North America about 40° N., extends in Australia only to 30° S. The ranges of mean summer and winter temperature are greatest inland, especially in the north-western part of the continent, where (in the upper basin of the De Grey River)

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Equator
Gilbert Islands
Admiralty Is.
New Britain Archipelago
New Ireland
New Britain
Bougainville
SOLOMON ISLANDS
Choiseul
Isabel
Malayta
Guadalcanar
Gulf of Papua
Strait
C. York
South Cape
Louisiade Archipelago
D'Entrecasteaux Archipelago
Woodlark I.
New Georgia
Motutti I.
Sta Cruz or Q. Charlotte
Torres Is.
Banks Is.
Espiritu Santo
Malekula
Aurora
Pentecost
Ambrym
Api
Vate
New Hebrides
Erromango
Tanna
Erromanga or Futuna
Aneityum
Loyalty Is.
New Caledonia
Lifu
Mare
Isle of Pines
Walpole
Matthew
Hunter
Conway
Avon I.
Belep Is.
Ivon or Malgan
Annatom
Norfolk I.
Philip I.
Lord Howe I.
Three Kings
North Cape
Bay of Islands
Hauraki Gulf
Auckland
Waikato R.
North Island
Bay of Plenty
Mt Whakari (White I.)
East Cape
Mt Hikurangi
Mt Egmont
Cook Strait
Hawke B.
NEW ZEALAND
South Island
Mt Cook
Mt Tasman
Mt Earnslaw
Southern Alps
Banks Penin.
Canterbury Bight
West Cape
Foveaux Strait
Stewart I.
Chatham Is.
Great Barrier Reef
Cape York Peninsula
Princess Charlotte Bay
Melville
Hinchinbrook I.
Halifax B.
Port Denison
Cumberland Is.
Palmerston
Northumberland Is.
Shoal Water
Capricorn Channel
Curtis Channel
Repulse B.
Whitsunday Passage
Whitsunday I.
Edgecumbe B.
Hervey B.
C. Sandy
Gr. Sandy I.
Moreton Bay
Brisbane
Danger Pt.
C. Byron
Shoal Bay
Port Jackson
Sydney
Lord Howe I.
Norfolk I.
Three Kings
North Cape
Bay of Islands
Auckland
Waikato R.
Mt Egmont
Cook Strait
Hawke B.
Mt Hikurangi
East Cape
Bay of Plenty
Mt Whakari (White I.)
Mt Cook
Mt Tasman

the shade-temperature sometimes exceeds 100° for weeks together. At Port Darwin, on the other hand, the difference between means is only 8·6°, and that between extreme temperatures is less than 50°. Regular observations of relative humidity have been carried on only at the state capitals, of which Sydney and Hobart are the most humid (90 per cent. and over in winter), and Adelaide the driest (below 30 in late spring and summer). Evaporation in the coastal areas varies from about 66 inches annually at Perth to 32 at Hobart; but inland figures far exceed these—84 in western New South Wales, 87 at Coolgardie, 97 at Alice Springs in the centre of the continent, and 146½ at Laverton, about 200 miles north of Coolgardie.

The official climatological divisions of Australia are, roughly speaking: (I.) Western Australia; (II.) South Australia with the western parts of Queensland and New South Wales; (III.) central and eastern Queensland, *plus* New South Wales north of the Darling; (IV.) New South Wales east of the Darling and north of the Murrumbidgee; (V.) Victoria and other areas south of the Murray and Murrumbidgee, including Tasmania. These areas are designed so that each includes at least one of the state capitals, at which important meteorological stations exist; but it is obvious that the results obtained in seaboard towns do not necessarily bear any relation to the facts of climatology inland.

Winds.—The most important permanent wind-currents affecting Australia are the south-east trades and the westerlies which blow along the Southern Ocean. The trades, following the sun, in winter operate only north of the tropic of Capricorn; in summer they are felt as far south as 30° S. lat. Conversely, the westerlies, which in summer scarcely touch the continent at all, in winter blow across the southern coast-belt, and sometimes are felt almost as far north as the tropic. Between the two currents lies the path of a great anti-cyclonic stream, a series of 'vast elliptically-shaped bodies of circulating atmosphere, measuring frequently 3000 miles in their major and 2000 in their minor axis' (H. A. Hunt). Between these bodies occur V-shaped depressions running inland from the Southern Ocean, and bringing with them cold rain and boisterous winds. Monsoonal depressions, bringing rain in from the warm northern seas, also occur, but more capriciously.

The winds inland are further affected by the comparative aridity and barrenness of the central tableland, hot under the blazing sun of summer, over cold in winter (at Alice Springs the mean maximum for December is nearly 100°, the mean minimum for July under 40°). This causes a spiral circulation from the coast inwards during summer, from the centre outwards in winter.

Among exceptional winds may be noted (*a*) the cyclonic storms of winter, produced along the southern coast by the passage of the V-shaped depressions—Bass Straits especially suffer from these; (*b*) the summer hurricanes of the north Queensland coast, luckily but occasional visitors from the island groups of the western Pacific; (*c*) the 'Willy-Willies' of NW. Australia, also summer visitors, which originate apparently on the ocean near Cambridge Gulf and travel south-westerly along the coast, displaying particular violence between the De Grey and Ashburton rivers. On the east coast, especially on that of New South Wales, a peculiar cycle of winds also deserves notice; the usual routine begins with a change from the ordinary north-easterly wind of the summer months to a dry, hot westerly, which lasts from six to twelve hours, and is then succeeded by a sharp inrush of much colder wind from the south. In the neighbourhood of Sydney this cycle is so regular that the passage of the southerly up the coast is officially signalled from the tower of the post-office to a population sweltering in the westerly heat. In midsummer the cool winds last no longer than the dry, hot ones, and the warm, damp north-easter comes back in a few hours; in spring and autumn, however, a southerly may last three days, maintaining cool and often wet weather all the time. The variations of temperature thus produced are trying, if grateful; the westerly raises the temperature ten to twenty degrees (though its dryness usually makes even the excess of heat more bearable than had been the long-continued warmth of the prevailing north-easters); the southerly brings with it an instant drop of equal or greater extent, and an eventual drop of thirty to forty degrees below the highest point reached just before. Professor Gregory's explanation of the cycle postulates a hot westerly (a return trade-wind) blowing steadily during the warm months at a high level over Sydney; whenever exceptional heat in the tropics cuts off the low-level inflow from the ocean (the north-easterly), this hot inland wind drops on to the coastal plain, but is soon extruded by the arrival of a cold wind from the Antarctic, which has been brought up by the same exceptional tropical heat.

The rainfall of Australia is, of course, determined mainly by the winds and air-systems already described. The south-east trades bring to the Queensland coast rarely less than 50 inches per annum, and at Innisfail, or Geraldton (lat. 17½°) the average mounts to 160 inches; the westerlies of the Southern Ocean maintain a steady 30-inch average in the south-western corner of Western Australia, and in eastern Australia south of lat. 36°. Inland the rains are mainly sucked in from the surrounding seas by the anti-cyclonic stream, or thrust in by the depressions. If a line be drawn from Sydney north-west to the Ashburton River in Western Australia, it may be said that north of that line is the region of summer rains (January to March), south of it that of winter rains (June and July); a narrow strip in southern Gippsland, Victoria, is exceptional in having its greatest rainfall in October. The driest part of the continent seems to be round Lake Eyre in South Australia, with an annual average of 5 inches; the 10-inch line includes all the area between the tropic and the Bight, east as far as the Darling River, west to and across the chief gold-fields of Western Australia; the 20-inch line takes in all Western Australia except its south-western corner and the Kimberley district, and nearly all the western tableland and the plains south of lat. 18°. The 20-inch area is bounded on the north from Broome (Western Australia) to the Gulf, and on the east down as far as Kosciusko, by a broad belt of country (chiefly foot-hills of the main range on the east) with from 20 to 30 inches; and that again by a narrow belt, mostly high land, with from 30 to 40. Higher averages occur only near the Leeuwin, in the peninsulas of the Northern Territory and Cape York, and along the eastern coast; the highest, as already mentioned, are recorded in the Innisfail district south of Cairns, where (at Goondi) the average is 166 inches, and in 1894 241½ inches fell. The following table has interest:

Rainfall.	Area of Commonwealth.
Under 10 inches	37 per cent., roughly.
10–15 "	20 " "
15–20 "	12 " "
20–30 "	18 " "
30–40 "	7 " "
Over 40 "	6 " "

Among exceptional rainfalls may be mentioned 22½ inches in 24 hours, a little south of Sydney in 1898; 35¾ inches in the same time, a little north of Brisbane in 1893; and 27¾ and 30¾ inches, at

places in the Innisfail district in the summer of 1911. At Whim Creek near Cossack, in Western Australia, 29½ inches was recorded in 1898—a remarkable record in so dry a district. Snow has been seen as far north as lat. 31°; in the Kosciusko district it covers large areas every winter, so that winter sports are regularly organised, and from the ravines surrounding Mount Kosciusko itself it never disappears. Droughts are of less common occurrence than is usually supposed, and are always local; even in the great drought of 1902, the worst known since 1827, the greater part of Western Australia had copious monsoonal rains. 'A good coastal season,' says the Commonwealth Meteorologist, 'ordinarily depends upon an anticyclonic control; when such exists, the country west of the tableland' (i.e. the eastern tableland) 'usually wants water.'

Botany.—The vegetation of Australia, as might be expected in a country ranging over so many degrees of latitude and varying so greatly in rainfall, is of an extremely varied character. The bulk of it is purely Australian, and many genera are of primitive type, existing elsewhere only as fossils. There are evidences of a long-past connection with South Africa, and northern Queensland—though not North Australia—possesses many forms of Malayan origin; otherwise the flora is practically unique.

The amount of vegetation naturally varies with the rainfall. Along the eastern coast and inland to the western foot-hills of the main range extends a well-timbered region; as the rainfall lessens the character of the timber varies, from the soft woods (pine, cedar, &c.) of the great coastal 'brushes' to the hard woods (mainly eucalypts) on the range and foot-hills. In Western Australia the important forest belt is, however, on the inland side of the main range, the jarrah and karri (two eucalypts) being its chief constituents. Where the rainfall is under 20 inches, forest growth ceases and the 'scrubs' of the plains begin, masses of shrub eucalpyts covering large areas of dry but otherwise fertile country; behind them come stunted and scattered trees and scant herbage, and in the central area three notable plant-forms—saltbush (*Atriplex* and *Rhagodia*), 'spinifex' (*Triodia*), and nardoo—the two former valuable as fodder in drought-time, the last a cryptogam (*Marsilea*) much used by the aborigines for food. The coastal forests have a dense undergrowth; on the ranges this largely disappears, and among the foot-hills lie noble expanses of rich pasture-land patchily timbered with fine trees, while the edges of the great plain are diversified with belts of pine (*Callitris*) of some commercial value. Two marked features of the vegetation throughout Australia, except in the few regions of heavy annual rainfall, are the aromatic scents of the foliage, particularly on warm nights—'the velvety scents,' says an Australian writer, 'that come from a wine-vat freshly filled with must;' and the habit in trees and shrubs, especially common among the eucalypts, of turning the leaves edgewise to the sun. In Tasmania even English oaks have been noticed to adopt this habit.

One hundred and forty-seven natural orders are represented in the Australian flora, and over nine thousand species. The most important and widespread genus—*Eucalyptus*—contains 230 species, which range from 2 to 320 feet in height (a long-believed legend told of gums over 400 feet high, but this has been disproved, and the admitted record stands at 326 feet—*Eucalyptus regnans*, a Gippsland species). Gum timber is usually interlocked, and varies in colour from the pale cream of well-watered districts through pink and red to the cigar-brown of the arid Western Australian tableland; the bark varies also from the smooth, white, thick covering of the trees generally called 'gum' trees through the 'ribbony' gums (*E. viminalis*) to the fibrous peppermint and stringybark, and the exceptionally hard ironbark (*E. paniculata, crebra*, and other species). The English names, it must be noticed, are applied vaguely to different species in different districts. Among other notable plant-forms are the wattles (*Acacia*), the most characteristic flowering shrubs of the tableland bush, their flowers being often used as the emblem of Australia; myalls, the wattles of the plain; 'honeysuckles' (*Banksia*), shrubs and trees with toothed leaves and bottle-brush flower-spikes, very full of honey; waratahs (*Telopea*), shrubs of the eastern ranges with large crimson flower-heads that glow like lamps along the bare ridges of the Blue Mountains; boronias, with tiny but very sweet-scented blossoms, heaths (nearly all *Epacris*), and the splendid 'Sturt's Desert Pea' (*Clianthus*) of the inland plains. There is also a wealth of flowering trees, many of them eucalypts, especially in Western Australia; the Queensland tulip-tree (*Stenocarpus*), the Illawarra flame-tree (*Sterculia*), and the Western Australian fire-tree (*Nuytsia*), all with gorgeous crimson or orange-coloured flowers, well deserve their names.

Among timbers of commercial value may be noted the ironbark and other eucalypt hard woods of the eastern tableland, the jarrah and karri of Western Australia, and the New South Wales turpentine (*Syncarpia*), which is much used for bridge-piles; of soft woods the Moreton Bay pine (*Araucaria*), the cypress pine (*Callitris*), the red cedar (*Cedrela*), and the red and black bean (*Dysoxylon* and *Castanospermum*) are the principal. Furniture woods are abundant and very varied—rosewood and silky oak in the east, sandalwood in the west, and blackwood (*Acacia melanoxylon*) in Victoria and Tasmania being the most noteworthy. The use of Australian fine-grained woods for ornamental furniture, parquetry, &c. has yet to be thoroughly developed.

Zoology.—According to Wallace, Australia was isolated from the rest of the world in Mesozoic times; and though there is evidence of a later land-connection with Asia, and of a land-bridge of some sort to South America (possibly through Antarctica, possibly along the line now marked by the Polynesian island-groups) that may have been late Mesozoic or early Tertiary, yet the Australian fauna has a markedly Mesozoic character. Neither cats nor pigs—families which exist everywhere else in the world—are found in Australia; its land mammalia consist of one dog, a few rats and bats, a large number of highly differentiated species of marsupials, and two remarkable monotremes. These, the platypus and the spiny ant-eater, are the most primitive mammals now in existence. The platypus (*Ornithorhynchus*, q.v.) is a mole-like animal, with a soft muzzle resembling in shape a duck's bill, found in eastern Australia as far north as the tropic; it lays soft-shelled yolk-bearing eggs at the end of long burrows excavated in river-banks, with an entrance under water. Its descent is traced from Theriodont reptiles, which became extinct in early Mesozoic times. The ant-eater (*Echidna*, q.v.) is a sort of porcupine to look at, about 20 inches long; it is a great burrower, simply disappearing into any soft ground on which it is laid; its eggs are hatched out in a temporary pouch something like that of a marsupial. Another variety of ant-eater and two species of an allied genus are found in New Guinea. The marsupial animals are provided with a permanent pouch in which the young are carried; among the more interesting are the grass-eating kangaroo and wallaby, the root-eating wombat, the carnivorous 'native cat' (*Dasyurus*), Tasmanian 'tiger,' and Tasmanian

'devil,' the leaf-eating 'opossum' and 'native bear,' and the omnivorous bandicoot. The marsupial ant-eater of the western tableland has fifty-four teeth, which seems a record. The Australian 'opossum' (*Phalanger*), the value of whose skin as fur has brought about a lamentable decrease in its numbers, must not be confused with the true or American opossum, which is a relative of the 'native cats.' The so-called 'flying squirrels,' which are not squirrels and cannot fly, are species of the 'opossum' possessing extra folds of skin between their limbs that act like the wings of a monoplane and allow them to glide from tree to tree.

Australian birds, as might be expected, are by no means so peculiar to the continent as are the mammals; but the emu, widely spread over Australia, and the cassowary of northern Queensland and New Guinea, are found nowhere else in the world; nor are the well-known lyre-birds of eastern Australia, which have been so destroyed for the sake of their beautiful tails that they can now be seen only in unfrequented valleys and after great precautions taken. Other characteristic birds are the mound-builders of the plain-scrubs, which hatch out their eggs by burying them in mounds of decaying leaves; the lories or lorikeets, which travel in flocks from place to place, following the flowering of the honey-yielding eucalypts; the honey-eaters, many of which (e.g. the gill-birds and wattle-birds) are shot for a food-delicacy; the migrant mutton-birds of the southern coasts, which once saved the little colony at Norfolk Island from starvation, and so prevented the abandonment of the parent settlement at Sydney; the innumerable varieties of parrot, cockatoo, and parrakeet; and the giant kingfisher or kookaburra, famous under the name of 'laughing jackass,' a gregarious snake-killer whose 'laugh' (though occasionally heard at other times) is its usual form of conversation with its mates on the roost at night and morning—wherefore the early colonists called it the 'settlers' clock.' The legend fostered by townsfolk that Australian birds are songless—derived, apparently, from a misunderstanding of an exaggerated phrase of Gordon's—is quite inaccurate. At morning and evening the bush is full of song; and the notes of the crow-shrike ('magpie'), bell-bird, and coachwhip-bird, and the mimicry of the lyre-bird, are particularly notable.

Reptiles include two crocodiles in northern Australia, tortoises whose nearest relatives are found in South America, 390 kinds of lizard (including a unique legless family), and about 100 snakes. About a quarter of these—pythons, carpet and tree snakes mostly, ranging up to 15 feet in length—are harmless; the rest are poisonous theoretically, but only a very few are dangerous to man. The tiger-snake is said by scientific authorities to have the strongest venom of any known snake; but it secretes so little, and its teeth are so short, that the danger is minimised. It has been known, however, to attack man, which no other Australian snake will do unless cornered. Amphibia are mainly represented by tree-frogs; one species (not arboreal) has acquired the habit of distending itself enormously with water and living through droughts in a cake of dried mud. Indigenous fresh-water fish are few, the Murray cod (*Oligorus*) being the best known; a Queensland mud-fish (*Ceratodus*, q.v.) owns a lung in addition to its gills, and breathes air direct, especially when it finds the water too foul; the belief that it can live in the mud of dried-up ponds lacks confirmation. Both the fishes and the worms of Australia emphasise the old connection with South America. The insects have not yet been thoroughly studied. Beetles and ants abound, the former in about 20,000 species; butterflies are much rarer, except in northern Queensland, where the numerous Papuan species have spread. Of the marine fauna, which on the whole is not specially distinctive, the most interesting genera are the Port Jackson shark (*Cestracion*), a survival from Mesozoic times, and the killer-whale (*Orca*), which helps the fishermen of Twofold Bay to capture its more useful relatives. Among edible fishes the principal are the schnapper (*Pagrus*), flounder (*Rhombosolea*), garfish (*Belone* and *Hemirrhamphus*), and jewfish (*Sciæna*), some of which run up to 100 lb. in weight.

The native fauna and flora have been considerably disturbed, and in some cases almost extirpated, by acclimatised importations. Of these the rabbit, fox, brown and rainbow trout, house-sparrow, and sweetbriar have made themselves most at home. As with the flora, the English names of Australian animals are vaguely applied in different districts to entirely different creatures; this is particularly noticeable among snakes and fishes. It is necessary, therefore, for the sake of clearness, to add in nearly all cases the generic name at least of the animal under description.

Aborigines.—Like its flora and fauna, the human natives of Australia are isolated and peculiar, separated by a wide remove from the Papuans, the Malays, and the Negroes. This isolation is not only racial; their way of life also is unique. Nothing is more common—or more condemnable—among writers on Australia than the careless adoption of ill-informed and unobservant descriptions of the 'blackfellow' given by early white settlers. Given a community cut off from the world while still in the hunter-stage of civilisation, and pent in a country none of whose animals lend themselves to domestication, it is hardly possible to conceive a way of living more skilfully and intelligently adapted to the environment than is that of the native Australian uninfluenced by the white invasion. Of a dark coffee-brown complexion, rather than actually black, the Australian stands not much short of the average European in height; his body and arms are usually well developed, but his legs are very lean and destitute of calves (a defect common to dark races). His head is long and narrow, with a low brow prominent just above the eyes, but receding thence in a very marked degree. The nose, proceeding from a narrow base, broadens outwardly to a somewhat squat end, the eyes on either side of its thin root appearing drawn together. The face bulges into high cheek-bones. The mouth is big and uncouth, the jawbone contracted, the upper jaw projecting over the lower, with large white teeth; the chin cut away, the lips coarse and flexible. The whole head and face, and often the whole person, is covered with a profusion of hair, which, when freed of its usually enclogging oil and dirt, is soft and glossy—silky, not woolly. His ears are rather pricked forward. The effluvium of his skin, noticeable in itself, is exaggerated by the fish-oil he uses to anoint his person. The intellect of the Australian, directed mainly to the means of procuring food, operates almost exclusively within the range of the bodily senses, and inside that elementary sphere displays no little nimbleness and skill. He is unsurpassed in tracking and running down his prey; and his weapons, though of the most primitive kind, are well adapted to assist him in that purpose, whilst his rude culinary and domestic apparatus manifests equal skill, and his choice of foodstuffs is almost that of an epicure. His uncouth but intelligent notions of art may be observed in the crude drawings of animals carved or painted on rock surfaces all over Australia—most artistic, curiously enough, among the wildest tribes. He has no architecture, almost no weaving, and no pottery; some authorities allege that he has no religion, but this can only be justified

by identifying religion with theism. He is capable of loyal affection and gratitude, and is hospitable within limits. Without doubt blackfellows have often murdered Europeans, but in many cases this was more or less legitimate reprisal for prior atrocities committed by the convicts or other reckless Europeans; in many others it was due to unconscious infringement by settlers of the native laws, as when an intruding white man shot kangaroos on a tribe's hunting-ground, and then objected to the natives spearing his cattle depastured in the same locality. Where caves abound some of the tribes seek no farther, but live in those ready-made tenements. None of them have fixed habitations; at best, only a screen of twigs and bushes covered with foliage or turf; sometimes, however, logs of wood and turf to serve for a few days' or weeks' shelter, till the pursuit of food calls them elsewhere. This is but natural; they know where and when certain sorts of food are in season, and regulate their journeyings accordingly. But they are not, as some writers declare, thriftless or improvident: they husband their provisions most carefully on a journey, and in certain cases prepare and preserve food when it is plentiful with great industry and foresight. The 'gin' is bound to keep her man in vegetable-food —roots of wild yam, seeds of acacia, sophoræ, leaves of the grass-tree, &c.—and if she fail to produce enough, she may be punished severely; but such methods of enforcing discipline are comparatively rare, and the ill-treatment complained of by gins whose tribes live near white settlers generally turns out to have been caused by more serious lapses from good conduct.

The blackfellow's weapons and implements, before white men provided him with theirs, were exclusively of wood, stone, or bone. The chief weapons are clubs, spears, and boomerangs—the last-named flattish curved bars of hardwood from 3 to 6 feet long, with a slight twist lengthways which steadies them in flight. Men and kangaroos can be badly damaged by their blow, and smaller animals killed outright. Lighter and more brittle boomerangs, made purely as toys, will return to the thrower, curving high in the air. Spears are either thrown or thrust with; in northern Australia the throwing-stick (*wommera*) is used to send them farther, faster, and straighter. Of implements the chief is a stone axe, neolithic in character; stone knives, mills, grindstones, and flint-chisels are also common. For obtaining food nets of native flax, woven with wooden needles, are used—all over the continent for fishing, and in the north also for trapping emus and pigeons; fish are also trapped by weirs, which are the only permanent constructions the aborigines have left.

Their social life is of extreme complexity and interest. Its bases can scarcely be described in such an article as this, but should be studied in the books mentioned at the end. Roughly speaking—for the many tribes have been so long isolated in their districts that all manner of diversities have crept in—the camp-council, swayed by the elders of the tribe, is the ruling body; so-called 'kings' are an invention of the unintelligent European. Tribes usually keep to particular districts, and have a friendly understanding with neighbouring tribes; but the normal attitude of a tribe to all others except its special friends is that of armed neutrality. Inter-tribal warfare is, however, very rare nowadays. Private quarrels are settled by personal combat, but not to the death, since murder is a serious public injury punished by the tribe. Social status depends entirely on age and on the passage through certain initiation ceremonies; the full number of these is four, but the higher ceremonies seem to be dying out, and very little is known of their details. The first only—that consequent on the approach of puberty—is compulsory, since no uninitiate may marry. Personal relationships are governed by an elaborate code. The child belongs to the same camp as its father, but may have relatives in many other camps through its mother's connections; names denoting relationship are group-names—i.e. 'mother' means not only the actual parent, but her sisters and connections along a certain line; and every woman in a certain group is potentially the wife of every man in another group, irrespective of their particular camps. The 'totems' of individuals are connected sometimes (e.g. in NW. Queensland) with these marriage-groups, sometimes (e.g. in central Australia) with purely accidental occurrences; this divergence, like many others, seems to have arisen from very early separation of the immigrating tribes, which will be referred to later on. For further details, see MARRIAGE, TOTEMISM, and similar articles.

Owing to the long-continued isolation of the tribes, the one language which (with exceptions to be noted later) seems to have been originally common to all has been converted into an enormous number of dialects. Thus in a Queensland district less than three hundred miles square are found seven very distinct dialects, one of them with two sub-dialects and one with five. Belief in an original unity is based partly on the similarity in nearly all dialects of the words denoting certain parts of the body, and a few pronouns and numerals, partly on the grammatical devices—especially the wide use of suffixes—common to practically all tribes. At the same time the actual vocabularies differ so greatly that only neighbouring tribes can understand each other. Along the northern edge of the continent, however (Cape York Peninsula, the Gulf coast, North Australia, &c.), both the words for simple things and the grammatical devices differ greatly from those used farther south, as well as among themselves; e.g. prefixes take the place of suffixes. While no definite connection can be established, it seems probable that the original Australian language was akin to the Dravidian languages of southern India, while the variations in northern Australia are due to considerable admixture of Papuan and even of Andaman elements. All the dialects are very poor in abstract terms and numerals, very elaborate as regards personal names and grammar. The sounds *s*, *f*, and *z* occur only in the northern dialects; *v* and *h* are very rare. In many tribes an extensive sign-language has been developed. It is interesting to note that a great many of the southern tribes take their names from their word for 'No'—the Kamilaroi using *Kamil*, the Wiradhuri *Wirrai*, and so on.

The now generally accepted theory about their origin is that they are an early offshoot of the Dravidian stock which was thrust into and along the Malay Archipelago by stronger tribes, migrated to northern Australia, either across Torres Straits or by a longer sea-voyage over the Arafura Sea, and spread over the continent in three main streams—one along the north-western and western coasts, one (which retains most fully the primitive customs) into the centre, and the largest along the eastern coast and highlands, right round the continent to South Australia. The commonly given estimate of 150,000 as the number of aborigines in Australia when Europeans first settled in it is merely a guess, no evidence of any kind existing. It is possible that 100,000 may be there now, mostly in western Queensland, North and Central Australia, and Western Australia; at the census of 1911 20,000 were recorded as living within the bounds of white civilisation.

All this information must be taken as the best

available approximation to the facts; more camps and tribes conform to the description than do not. It is difficult to make any statement regarding them which is universally true; e.g. a few central Australian tribes have definite headmen—though their authority is very vague—chosen on the hereditary principle, whereas among the mass of tribes that principle is quite unknown. Nothing but careful study of the latest and most experienced authorities on the subject can give the reader accurate knowledge of details.

Discovery and Settlement.—The exact date when Australia was first discovered by Europeans will probably always be an insoluble problem. It has been asserted that a coast-line marked on a British Museum *mappa mundi* must be that of Western Australia; indeed, some authorities declare that an allusion by Lucian (150 A.D.) to animals that 'use their belly like a pouch' must have been inspired by sailors' talk of the kangaroo. In 1526 the Portuguese were in New Guinea; if, as is likely, they during the next few years discovered northern Australia, Spanish claims to the Moluccas and all lands east of them (see the Weimar map of 1527) would keep the discoverers silent. In the Dauphin map (1530–36) Australia's place is occupied by 'Jave le Grande.' A good deal of confusion has been caused by the mediæval geographers' habit of inventing a southern continent for purposes of symmetry, the constant references to this entirely theoretical region being taken by laymen as mentions of the genuine Australia. The first European about whose sight of the continent we can be certain was the Spaniard Torres, who, coming across the Pacific, in 1606 sighted the coast south of Cape York, and afterwards sailed through Torres Straits; he, however, had no idea that he saw any more than a group of small islands like those he had previously been traversing. About the same time the Dutch vessel *Duyfken* was sailing down the west coast of the Cape York Peninsula, having avoided the western opening of Torres Straits because navigation in such a labyrinth of sandbanks, with adverse currents and strong south-east trade winds, was too dangerous for the clumsy vessels then employed. In 1623 the *Pera* had a similar experience; but Dutch belief in the existence of the Straits was not destroyed until Tasman's voyage of 1644, when for unknown reasons that explorer announced definitely that the southern land was part of the New Guinea mainland. On the western coast discoveries began when, in 1611, the official course for Dutch ships outward-bound to Java was altered from the track past Madagascar to a long easterly run from the Cape, followed by a sharp bend northwards. In 1616 the *Eendraght*, sailing on this course, sighted Australia in lat. 26°, and its captain, Dirk Hartog, left an inscribed metal plate on the island still called after him. From that time such discoveries became frequent, and the visitors left Dutch names all round the western shores from Nuyts Archipelago on the east of the Bight to Arnhem Land on the Gulf of Carpentaria—which also was named after a Dutch governor-general of the Indies. Pelsart (1629), Tasman (1642–44), and the Englishman Dampier are the most notable of the discoverers during this epoch, and the first and third gave Europe fairly detailed, and none too favourable, descriptions of the western coast-lands. The second epoch of discovery begins with Captain Cook (q.v.), who in 1770 sighted the south-eastern coast below Cape Howe and coasted northwards along the shore to Cape York, annexing the region he had found to Great Britain. Little more was done, except in southern Tasmania, till the first settlement was made at Sydney in 1788 under Governor Phillip; but thereafter discoveries and detailed surveys along the coast became frequent, the chief names being those of Bass, who first sailed through Bass Straits; Flinders, who with Bass circumnavigated Tasmania, and afterwards made a thorough survey of the coast of the continent from Cape Leeuwin by the east to Arnhem Land (except such portions between Encounter Bay and Sydney as had been worked over by minor men); and P. P. King, who completed Flinders's work by surveys along the northern and western shores.

The settlement at Sydney was designed for convicts, who must be kept for discipline's sake strictly within bounds. The early governors, therefore, did not much encourage exploration inland; but Macquarie (1810–21) altered this policy entirely, backed the expedition under Blaxland which first crossed the Blue Mountains (q.v.), and aided the pastoralists who, following in the tracks of Blaxland's successor Evans, poured across into the western plains and along the valleys of the Macquarie and Lachlan. Oxley in 1817 traced both these rivers to apparently impassable marshes, and in 1823 discovered the Brisbane River; Hume in 1824 crossed from Sydney to Port Phillip; Cunningham (1823–28) worked north behind the main range and discovered splendid pastoral country at the back of Moreton Bay. Sturt, the greatest and most unfortunate of Australian explorers, discovered the Darling in 1828, the lower Murray and its affluents in 1829 (voyaging along it to its mouth and back under great hardships), and in 1844–45 traversed the always arid country west of the Darling to Cooper's Creek in a season of exceptional heat, returning with shattered health and eyesight permanently injured. Meanwhile Mitchell (1831–36) connected all previous discoveries in New South Wales, crossed western Victoria to the sea, and returned by Hume's old tracts; as in 1835 two Tasmanian settlers, Batman and Fawkner, had explored and begun to settle the shores of Port Phillip, south-eastern Australia from Brisbane to Adelaide was by 1837 fairly well known and in process of settlement. Settlement was at this time and for fifteen years afterwards almost purely pastoral, since John Macarthur, a settler of the very early days, had found out that the climate was admirably suited for the growing of the finest grades of merino wool; as this product was valuable enough to bear the huge cost of carriage over long distances to a port, it became the exclusive staple of eastern Australia, and the whole commercial system of the colonies was devised to suit it. Coal was mined on the coast of New South Wales, and copper during the forties in South Australia; otherwise the occupied land was given over wholly to cattle and sheep, particularly sheep.

The gold-discoveries of 1851 altered all that, both enormously increasing the town populations and planting among the scattered pastoral settlements bodies of men who needed food-supplies in their immediate neighbourhood. From that began agriculture, hitherto badly neglected; but the farms had to be taken from the squatters' best grazing-land, and the war between squatter and 'selector' soon became a dominating feature both in the settlement and in the politics of the colonies, besides gravely affecting their finance—since squatters endeavoured to protect their grazing-land by purchasing it with borrowed money, and in times of drought (for which they made very little provision) found themselves in the hands of the banks, which in their turn were overloaded with unrealisable securities. Not till the settlers understood that the evil of dry seasons could be minimised, like any other recurring misfortune, by forethought and improved methods of farming, and the legislatures had been convinced that agriculture, not sheep-farming, must be encouraged on all soils fit for it, did Australian settlement become much

more than an exciting gamble; till then the country as a whole, taking results over a number of years, prospered and the bounds of settlement extended, but at the cost of huge individual losses.

In the third exploration period, during which the work of opening up the centre and west of the continent was based on a fairly populous coastal community, the chief names are those of Stuart, Gregory, and Forrest. An intermediate period, in the forties, had been made notable by the work of Eyre along the Bight, Leichhardt along the main range in Queensland and thence past the end of the Gulf of Carpentaria to Port Essington in North Australia, and Mitchell in central Queensland; Sturt's great journey at this time has already been mentioned. The gold-rush checked exploration, but towards the end of the fifties A. C. Gregory, already expert in Western Australian travel, extended the borders of the region opened up by Leichhardt, and McDouall Stuart found good grazing-country west of Lake Eyre. One of the greatest and most successful of all Australian explorations was Stuart's passage across the continent from south to north, achieved (against immense difficulties after two failures) in 1862, on a route which still remains the best known and has been made permanent by constructing along it the overland telegraph-line to Port Darwin. Stuart, however, was not technically the first man to cross the continent; that had been done in the previous year by the tragic expedition of Burke and Wills, who made their way from the Darling by Cooper's Creek to the estuary of the Flinders on the Gulf of Carpentaria. On their return journey, however, partly because of misunderstood orders and bad luck, partly because the leader was totally inexperienced in bushcraft, they perished miserably of starvation near Cooper's Creek. But the expeditions sent out to find them did really good work, so that by the end of 1862 Australia east of the telegraph-line was well mapped out. Later explorers therefore set themselves to open up Western Australia; F. T. Gregory penetrated the north-west, and Alexander Forrest joined up his discoveries with the Victoria River in North Australia; Warburton and Giles made hurried journeys across the central region from South Australia to the west coast; but John Forrest, travelling more steadily and observing his surroundings as he went, opened up new and valuable districts both in the south behind the Bight country and in the centre between lats. 25° and 28°. In these regions settlement is almost entirely pastoral, except where the astonishing mineral wealth of the tableland has been tapped on gold-fields which stretch across the western state from the Murchison south-east to Dundas.

The political settlement of the continent, since no foreign power has ever interfered in it, need not here be recounted at length. The first colony, New South Wales, though for many years it occupied actually a mere fraction of the south-east corner, stretched nominally across Australia to long. 135° E., Tasmania—which was at first thought to be part of the mainland—being included. In 1825 Tasmania became a separate colony under a lieutenant-governor. In 1827 the western boundary of New South Wales was removed to long. 129°, and the region west of that line was two years later constituted the colony of Western Australia. In 1836 a large section of southern New South Wales was segregated to form the province of South Australia; in 1846 an unsuccessful attempt was made by Mr Gladstone, then Colonial Secretary, to form a colony of Northern Australia in the territory north of lat. 26°; a lieutenant-governor was actually sworn in and a legislature formed, but Earl Grey, on taking office as Mr Gladstone's successor, hastened to annul these actions. In 1851 the lands south of the Murray were separated from New South Wales to form the new colony of Victoria, and in 1859 the area (roughly speaking) north of lat. 29° and east of long. 141° was constituted the colony of Queensland. This left the mother-colony in two widely separated sections—the one which still retains the original name of New South Wales, and one embracing as much of the territory between longs. 129° and 141° as was not South Australia. Of this section a strip on the north-east was added to Queensland, a strip on the south-west to South Australia, and the remainder, under the name of the Northern Territory, was retained in the possession of Great Britain, but handed over temporarily to be administered by South Australia.

By 1863, therefore, the continent had been divided among five distinct colonies (Tasmania being the sixth), each with a seaport capital, and each consequently somewhat jealous of the rest and determined to preserve its own territory's trade for its own capital. Other motives of severance were provided (*a*) by the almost arrogant pride of the two colonies—South Australia and Victoria—to which convicts had never been sent, and the fact that Western Australia continued to receive convicts up to 1868, while Tasmania had seen the last of them in 1852 and New South Wales in 1840; (*b*) by the development in Victoria of a protective fiscal policy towards which South Australia gradually tended, while New South Wales remained sturdily free-trade and influenced Queensland in the same direction. Efforts made by the British government in the fifties to introduce some form of federation failed entirely. But during the eighties problems of external policy, which affected most of the colonies equally, began to need instant attention; the immigration of Chinese, troubles with France over the convict population of New Caledonia and with Germany over the division of eastern New Guinea (which Queensland had annexed *en bloc*, only to find her action disavowed by the home government), and a growing sense of Australia's defencelessness, all enforced the necessity for a united action which was quite impossible to six mutually distrustful colonies. Even so it took nearly twenty years to reconcile the legislatures to surrendering a part of their powers to some central body; indeed, federation was only achieved by the bold action of a premier who appealed to the electors at large over the head of parliament. In 1901 the Commonwealth of Australia came into being as the sole authority through which Australians could deal politically with the outside world, the six Colonies being thenceforth known as States.

Government and Defence.—The history of Australian government falls into four stages. From 1788 to 1823 the governor was locally absolute, responsible to no one except the home authorities. From 1823 to 1842 he was assisted by a nominated legislature with advisory powers. From 1842 to 1856 two-thirds of the legislature was elected by freeholders and a few others; it could initiate legislation, and had a large measure of control over colonial finance. From 1856 onwards responsible government existed in its fullest sense. The dates just given refer to New South Wales, of which all the other Colonies except Western Australia were at one time a part. Tasmania entered the second stage in 1825, the third in 1850; Victoria was separated during the third stage, Queensland during the fourth; South Australia, beginning with a dual absolutism of Governor and Land Commissioners, entered the second stage in 1843 and the third in 1851. All these Colonies gained responsible government together. Western Australia had only two years of absolutism, but its second stage lasted from 1831 to 1870 (since transportation did not

cease till 1868), and its third till 1890. Since the establishment of responsible government the only change has been that which redistributed governmental powers between the States and the Commonwealth.

The government of the Commonwealth is vested in a governor-general appointed by the crown, and two houses of parliament—the Senate, consisting of six representatives from each state, elected for six years (three every third year) by the whole body of state electors; and the House of Representatives, seventy-five members elected by districts as nearly equal in numbers as possible (but ranging from 30,000 to 45,000), except in Tasmania, to which five members are allotted irrespective of its insufficient population, and in which the constituencies range from 18,000 to 23,000. The Federal Parliament has sole control of external affairs (including the restriction of immigration), customs and excise, defence, posts and telegraphs, oversea and inter-state commerce, and may when it likes make laws regulating marriage, banking, and many other matters of common interest. An important part of the governmental machine is the Federal High Court, consisting at present of seven judges, which besides the ordinary judicial functions with respect to matters of federal concern is also empowered to decide whether by any particular law or act the Federal government has transgressed the limits of the constitution, and has hitherto interpreted those limits very strictly. (For the Federal Arbitration Court, a branch of the High Court, see ARBITRATION.) The Federal government has full control of the territories (North, Central, Federal) which are actually part of the Commonwealth, and of the dependency of Papua (formerly known as British New Guinea), which is outside it; it also administers certain 'mandated' areas, formerly German colonies, lying between Dutch New Guinea and the British Solomons. Among its most important acts has been the construction between 1909 and 1912 of a complete system of Australian defence, based on the principles of compulsory military training and local fleet-maintenance, and developed in accordance with recommendations made by Lord Kitchener and Admiral Sir R. Henderson. The local squadron, designed as a 'unit' of an imperial Pacific fleet on a plan drawn up at the Naval Conference of 1909, included a battleship (H.M.A.S. *Australia*, 19,200 tons), three light cruisers (5600 tons), six ocean-going destroyers, and two submarines, all built out of revenue; with the necessary naval bases and other works, the cost amounted to about a million annually for construction and a million and a half for maintenance. The army, based on a system which trains boys of 14 to 18 as cadets and youths of 18 to 25 as territorial militia, was planned to comprise—when the system was in full working order—nearly 90,000 trained soldiers (Light Horse, 10,000; Infantry, 63,000; Artillery, 7000; Engineers, 3000), with 16,000 recruits annually in training. Military expenditure just before the Great War amounted to about 3¼ millions annually. Australia's total defence expenditure was at that time 5¾ millions a year, or about 23s. 6d. per head of population. The war temporarily upset all these arrangements. The squadron, after engaging in minor operations in the Pacific (always under the direct orders of the Admiralty), was split up among various imperial squadrons, and (though the destroyers were handled as a single flotilla) became a collection of individual ships operating in all the oceans. The army was superseded for fighting purposes by a volunteer force—the Australian Imperial Force, known as the A.I.F.—that served at first in Egypt and on the Gallipoli peninsula, its light horse subsequently fighting in Palestine, while the infantry and artillery went to France. Gradually a connection was established between the regiments of the A.I.F. and those of the citizen army; and after demobilisation of the A.I.F. its officers were as far as possible absorbed into the citizen forces and given the training of the annual contingents of recruits.

The State governments consist of governors appointed by the crown, and legislatures of one or two houses. The Upper House or Council in New South Wales is nominated, as was that of Queensland, abolished in 1922; in the other states it is elected for six years by a limited electorate. All the Lower Houses or Assemblies are elected by adult suffrage; in four States (New South Wales, Victoria, Queensland, and Western Australia) there are single-member constituencies; in South Australia forty members are elected by twelve constituencies, and in Tasmania thirty by five under a system of preferential voting. Victoria and Queensland also have preferential systems, and New South Wales the second ballot—which works so badly that a preferential system is certain in the near future. The States retain all powers not expressly surrendered to the Commonwealth by the constitution; the chief of these concern land, education, railways, and local government in general; they may levy direct taxation in any form; and their boundaries cannot be altered without their own consent. For further particulars concerning government, see under the State concerned.

Population, Religions, Education, &c.—The population of the Commonwealth at the census of 1921 was 5,426,008, exclusive of full-blooded aborigines; this is an increase since federation of rather more than 1½ millions in twenty years, or little more than 2 per cent. per annum. The proportion of males to females is about 51 to 49; males are in excess at every age, but among persons under twenty-one the excess is very small. The following results are taken from the census of 1911: eighty-two per cent. of the population was born in Australia, over 13 per cent. in the United Kingdom, and about 1½ per cent. in some other European country; the people are thus overwhelmingly British. Queensland and Western Australia are the only States in which the non-British population exceeds 5 per cent. (the Northern Territory, with its three thousand inhabitants, is not included in this discussion). The increase of population between 1901 and 1911 was due mainly to a high rate of natural increase (births *minus* deaths), less than 14 per cent. of it arising from immigration; between 1901 and 1905, indeed, there was a loss of nearly 17,000 souls due to emigration. Unfortunately the greatest increase was in the vicinity of the six State capitals, which in 1911 contained 38 per cent. of the total population. Classified by occupations, 13 per cent. were engaged in primary production, 12½ in town industries, 6½ in commerce, 4½ in domestic service (including hotels, boarding-houses, &c.), 3½ in transport, and 3 in professional work; 55 per cent. were 'dependent on natural guardians;' about ½ per cent. returned themselves as of independent means; the rest were unspecified.

Australia has no state church, but a large number of people of indefinite belief usually return themselves as belonging to the Anglican church; the census results therefore show that denomination as predominant with 38 per cent. of the population, the Roman Catholic church claiming 21 per cent., and the Presbyterian and Methodist churches a little over 12 per cent. each. Remarkable features of the religious census (which was practically complete, only 2½ per cent. of the population refusing to state their religion) were the great

increase in Presbyterianism—31 per cent. in the ten years, against Anglicanism's fourteen and the eight of the Roman Catholics—the large number who returned themselves as 'Protestant' or 'Catholic' without further definition, and the great falling-off among 'Freethinkers,' 'Agnostics,' and the like, who were actually 16,000 fewer than in 1901.

Methods of education are dealt with under the separate States and in EDUCATION. The simpler results, as disclosed by the census, are that about 1½ per cent. of those between ten and twenty years of age, and about 6 per cent. of those over the latter age, may be unable to read and write English; as quite half the individuals included in this calculation made no return at all, and a good many more (about 1 per cent. of the total) could read and write in a foreign language, the actual illiteracy is much smaller. Of the children of 'primary' age (seven to twelve) 75 per cent. go to state schools and 16 per cent. to private schools; but of those fifteen years old less than 20 per cent. go to schools of any sort, and at eighteen the percentage sinks to 3, not including about three in every 1000 who attend the universities.

Literature.—Australian literature has been unduly praised and unduly belittled, the one treatment probably a consequence of the other. A brief review of its history is therefore worth making. Apart from the work done in or about Australia by English writers of the early days, and from the outburst of excellent journalism excited by bitter political controversies in the forties of last century (to which Henry Parkes and Robert Lowe—afterwards Lord Sherbrooke—were the chief contributors), the first indigenous literature sprang from a little circle of writers encouraged by J. L. Michael, a friend of Ruskin and Millais and a strong supporter of the Pre-Raphaelite Brotherhood. His most notable *protégé* was Henry Kendall, a lyrist of high order, whose best verse still sets the standard for pure beauty among Australian writers. Adam Lindsay Gordon (q.v.), who is often coupled with Kendall, was merely an English schoolboy with a talent for brisk rhyming and a love of horses and the open air that appealed to his Australian audience; and his editor, Marcus Clarke, was a brilliant but shallow journalist with no knowledge of the bush—though Clarke's one great novel, *For the Term of his Natural Life*, is a masterpiece of documented fiction. D. H. Deniehy and William B. Dalley carried on the tradition of good journalism in New South Wales, and Brunton Stephens in Queensland produced studious but rarely inspired verse during the seventies; and in the eighties a number of native-born students began to write thoughtfully, imitating the current English phraseology. But in the eighties a new spirit was already moving among new men. The spread of state-school education gave the worker articulate utterance just when a new journal, fanatically insistent on Australian 'nationality,' threw its columns open to all local work with a spark of talent in it; and towards the end of the nineties a series of volumes, both in prose and in verse, collected from the *Bulletin's* pages, made known to Australians at large and, in some degree, to oversea critics the rise of a genuine locally-stimulated literary movement. Of this movement the real leaders were John Farrell, whose work excited the admiration of Lord Tennyson, and Henry Lawson, whose best prose is gaining a European reputation, though his verse is weaker and very uneven. Victor Daley, a truer poet than any except Kendall, is hardly known outside Australia because his work is almost devoid of definite local colour, though it could scarcely have been written anywhere but in the glowing Australian sunshine. Other good work, similarly neglected outside Australia for a similar reason, may be found in the scanty production of Christopher Brennan and the austere symbolisms of Bernard O'Dowd; and Australian literature cannot be apprized without a knowledge of the writings of these five. In prose fiction, apart from Lawson's short stories and Clarke's one masterpiece, Australia has nothing of permanent value to show, but much of more than passing interest. In other branches fine work has been done—notably MacCallum's Shakespearian studies, and the legal and constitutional essays of Harrison Moore and Jethro Brown; while the mass of historical material recently made available has set students to the reconstruction of Australian history—work of which Henderson's *Sir George Grey* and Scott's *Terre Napoléon* and *Matthew Flinders* are good examples. In drama nothing of importance has yet been done.

In music Madame Melba's name is famous, and those of Percy Grainger and George Boyle likely to be so. In art the work of Bertram Mackennal and Charles Conder is usually cited, but their training was entirely European; that of George Lambert and Arthur Streeton can be more justly claimed as Australian in origin, so far as art has any nationality at all. In science the achievements of Baldwin Spencer (in ethnology), C. J. Martin (physiology), James P. Hill (embryology), T. W. David and H. J. Jensen (both in geology), are based on Australian research during long residence there, though most of them were English-born. Professor Elliot Smith is an Australian.

Australian journalism, though markedly clean and sober in its tendencies, has rarely been of a high order; the few exceptions have been already mentioned. The daily papers are cramped by the political leanings of their advertisers, and the weekly and monthly magazines swamped by the influx of British and American competitors. A few endeavours—notably the *Australian Magazine* of 1899—to establish magazines of high standard died young for lack of advertisements. Of actual journals there is no lack; the six State capitals between them support more than a score of daily newspapers, and the total number published in the Commonwealth is about 1200.

Commerce and Industry.—Industries are under State control, except in cases where an industrial dispute extends beyond a single State; inter-state and oversea commerce are entirely under Federal control, and the latter is subject to a uniform customs tariff established by the Federal Parliament in 1908, with slight amendments made in 1910 and 1911. The tariff was in 1914 revised by the Inter-State Commission, and its recommendations were accepted practically without debate during the war; the revision made in 1921 by the parliament shows clearly that Australia has accepted definitely a fiscal policy of protection to native industries, coupled with (*a*) effective preference to British goods over foreign, (*b*) allotment to the employees of a substantial share of the benefits obtained from protection, (*c*) the co-existence of light duties on certain articles of common consumption and heavy duties on certain luxuries, for the purpose of obtaining revenue. All political parties have accepted this policy, with a view of making the Commonwealth as far as possible self-contained in war-time (as well as for other reasons); and it is probable that for the future tariff alterations will be entrusted to a non-political business board.

Communications.—The railways of Australia, having been constructed almost entirely by the several States with a view of bringing traffic to the state capitals, are a distinctly heterogeneous collection of imperfect systems, descriptions of which

will be found under the States concerned; but lines now under consideration or construction will to some extent create from them a larger system worth noting here. It will comprise (*a*) a coastal line from Cairns in northern Queensland to Sydney, with an extension across the tableland to Melbourne and Adelaide—this line will be relieved by a parallel line on the tableland between Brisbane and Sydney, a direct line from Sydney *viâ* Bathurst and Broken Hill to Adelaide, and inland connections between the last two lines; (*b*) lines from Adelaide, diverging near the head of Spencer's Gulf, across the continent west and north to join up Western Australia and North Australia; (*c*) possibly a third transcontinental line north-west from Sydney across Queensland into North Australia, dividing there so that one branch joins the northern transcontinental, the other reaches a new port on the Gulf just below the estuary of the Roper River. Of these the western and northern transcontinentals, and all lines within North and Central Australia, are to be constructed by the Federal government on a gauge of 4 feet 8½ inches; the rest in existence or under construction are State-controlled and of the State gauge, whether it be 4 feet 8½ inches as in New South Wales, 5 feet 3 inches as in Victoria and the south-eastern corner of South Australia, or 3 feet 6 inches as in the other states. This variety of gauges, coupled with the many other divergences of railway and commercial policy between the states, makes the creation of the complete system just outlined a matter of difficulty and delay; but all important railway work now being undertaken or projected is an approximation towards it, and it has been decided that all main lines shall gradually be converted to the Federal gauge.

Sea-communication between the States is carried on by steamships of a gross tonnage of 250,000 and an indicated horse-power of 211,000. The oversea mail-boats do not carry coastal freight. The Federal Post-office controls nearly 6000 offices, two-thirds of which are also telegraph-offices, and deals with nearly 600 million letters and 338 million other postal articles annually, also transmitting about 15 million telegrams, and about 500,000 cablegrams to places beyond the Commonwealth. Since 1910 it has subsidised the Orient Mail line for oversea service, and pays about £50,000 a year to inter-state shipping-companies for carrying coastal mails, and about £20,000 for services among the islands of the western Pacific. Other companies, subsidised by their own governments or unsubsidised, take regular mails for Europe, Canada, and the United States; to South Africa there are frequent but irregular services. The normal length of transit of mails from London to Adelaide is a little over twenty-eight days; Sydney gets them two days later. Telegraphic communication with countries beyond the Commonwealth is carried on by three western cables under private control—from Port Darwin to Banjoewangie, from Broome to Banjoewangie, and from Fremantle *viâ* Cocos Island to Durban—and three eastern cables, one to New Zealand, one to New Caledonia, and one—the Pacific cable—to Canada, with a double route as far as Norfolk Island (from Southport in Queensland direct, and from Sydney *viâ* New Zealand). The route-lengths to London are *viâ* Broome from Perth 12,296 miles, *viâ* Port Darwin from Adelaide 13,125, and *viâ* Canada from Sydney 15,158. The Pacific cable is the property of the British, Australian, Canadian, and New Zealand governments, Australia having slightly the larger share. A system of wireless telegraphy has been established round the Australian coasts, and in Papua and the mandated territories.

Statistics.—The following table illustrates the progress of the Australian Commonwealth since its birth in 1901:

	1901.	1920.
Population	3,773,801	5,426,008 (1921)
Rate of natural increase per 1000..	14·21	15·12
Federal revenue	£11,296,985	£52,782,750
State revenues, total (including businesses)	28,197,927	70,071,743
Total revenue raised in Australia	32,130,673	116,137,126
Federal expenditure from revenue	3,932,746	49,517,097
State expenditure from revenue (including businesses)	29,231,385	72,046,447
Total expenditure from revenue in Australia	33,164,131	114,843,052
Public debt	203,518,275 (Federal, *nil*)	820,105,439 (Federal, £402,795,667)
Sinking funds (about)	£1,550,000 (Federal, *nil*)	£13,950,207 (Federal, £2,169,301)
Bank deposits (ex. Savings-banks)	91,487,148	265,628,592
Bank assets	121,547,813	269,874,273
Savings-bank deposits	30,882,645	143,304,487
" " per depositor	32	45
" " per inhabitant	8·15	26·8
Area under crops (acres)	8,414,054	13,298,516
Wheat-yield (bushels)	38,561,619	144,190,965 (1921)
Direct overseas imports (value)	£44,555,348	£98,974,292
" " exports "	49,685,509	149,823,509
Government railways (mileage)	12,578 (all State)	23,147 (Federal 1734)
" " (net earnings)	£3,899,000	£7,340,371

Figures in the right-hand column, except when otherwise dated, are for the statistical year from July 1919 to June 1920.

See the articles NEW SOUTH WALES, QUEENSLAND, SOUTH AUSTRALIA, TASMANIA, VICTORIA, WESTERN AUSTRALIA. For all statistical and general information, with regard to States as well as Commonwealth, the series of *Official Year Books of the Commonwealth* is indispensable; the latest annual issue is of course most up to date, but valuable articles on special subjects occur in the earlier volumes only, being merely indexed in the later. The unofficial *Year-Book of Australia* is also trustworthy on the limited range of subjects with which it deals. Rusden's *History of Australia* is the only history on a large scale; the *Historical Records of New South Wales*, and the *History of New South Wales from the Records* founded on them, are practically exhaustive on the very early days; the *Historical Records of Australia* are at present concerned almost entirely with the despatches of the early governors; Wyatt Tilby's *Australasia* (1912) and Rogers's *Australasia* (1907, in Sir C. P. Lucas's 'Historical Geography' series) are interesting but sketchy; the present author's *Australasia* (1901, in Temple Primers) and *History of Australasia* (7th ed. 1921) present in condensed form much otherwise unpublished matter. For physical geography and geology, Gregory's *Australasia* (1907) and Griffith Taylor's *Physiography of Australia* (1913) are the best available; Lucas and Le Souef's *Animals of Australia* (1909), Maiden's *Useful Native Plants of Australia* (1889), and Waterhouse and Lyell's *Australian Butterflies* (1914) are sound works, but the flora and fauna have been usually written up by experts in the various States (see separate articles). Collingridge's *Discovery of Australia* and Favenc's *History of Australian Exploration to 1888* are still the best compendia on these subjects; see also Hooker's *Journal of Sir J. Banks*, Scott's *Life of Matthew Flinders* (1914), and the published journals of Sturt and Mitchell. On the aborigines, Spencer and Gillen's *Native Tribes of Central Australia* (1899), Spencer's *Native Tribes of Northern Australia* (1914), Roth's *Ethnological Studies* (1897), Howitt's *Native Tribes of South-Eastern Australia* (1904), and John Mathew's *Eaglehawk and Crow* (1899) are sound authorities. Social questions are well handled in Clark's *Labour Movement in Australasia* (1907), and Schachner's *Australien* (1909, 1911, not yet translated into English); the discussion in Wise's *Commonwealth of Australia* (1909) is also useful. On agriculture there is nothing better than the admirable Report of the Scottish Commission, republished as *Australia, its Land, Conditions, and Prospects* (1911). Other useful works are Harrison Moore's *Constitution of the Commonwealth* (2d ed. 1910), Reeves's

State Experiments in Australia and New Zealand (1902), Bean's *Flagships Three* (1913), and the *Australasian Naval and Military Annual* for defence matters, and Fred Johns's *Who's Who* for biographies of prominent men. So much study has been devoted to Australian subjects since the coming of the Commonwealth, and so much new material has been forthcoming, that all earlier compilations dealing with those subjects must be read with caution, and many of them with profound distrust.

Austral Islands, or TUBUAI, a scattered group of South Pacific Islands, south of Tahiti and south-east of the Cook Islands. The chief islands are Rurutua, Vavitau, and Rimitara. Rapa, or Oparu, has great stone platforms and walls like the Easter Island terraces. The group forms part of the French Establishments in Oceania. Area, 115 sq. m.; pop. 2500.

Australopithecus africanus, a fossil anthropoid ape of early Pleistocene age, of which a skull was got at Taungs in eastern Bechuanaland in 1925.

Austrasia ('East Kingdom'), the eastern possessions of the Franks, embracing Lorraine, Belgium, and the right bank of the Rhine, with their central point at Metz. Under Charlemagne's successor, Austrasia merged into Germany; and Neustria, or West Frank-land into France. See FRANCE, FRANKS, NEUSTRIA.

Austria, since 1918 a republic of Central Europe, was till that date (with much wider bounds) an empire constituting one moiety of the Austro-Hungarian Monarchy (see AUSTRIA-HUNGARY). The areas and populations of the seventeen lands of the Austrian Empire at the census of 1910 will be found in the article AUSTRIA-HUNGARY.

In 1920, after the formation of the Czechoslovak republic, and cessions to Rumania, Poland, Italy, and Serbia (Yugoslavia), there remained to Austria some 30,000 square miles with 6,000,000 inhabitants. To this was added part of German-speaking West Hungary (Burgenland) allotted to Austria by the treaty of St Germain, but curtailed in 1922. The republic is a federation of nine 'lands,' including the federal capital.

	Area in Sq. Miles.	Population in 1923.
Vienna (federal capital)	107	1,865,780
Lower Austria	7,452	1,480,449
Upper Austria	4,626	876,074
Salzburg	2,762	223,023
Styria	6,323	978,845
Carinthia	3,680	370,748
Tirol	4,882	314,836
Vorarlberg	1,005	139,999
Burgenland	1,532	285,609
	32,369	6,535,363

The chief towns are Vienna, Gratz, Linz, Innsbruck, Salzburg, Wiener Neustadt, Klagenfurt, Sankt-Pölten, Villach, Baden-bei-Wien, Steyr.

Austria is almost entirely mountainous. The Rhætian and Noric Alps stretch from Switzerland to the Danube, rising in several places above 12,000 feet (Wild Spitz, 12,369; Gross Venediger, 12,008; Gross Glockner, 12,461—the Ortler Spitze, 12,802, fell to Italy in 1919). Their height gradually declines towards the Hungarian plain and the Danube valley in the north-east, where the Leitha Gebirge (3000 feet), overlooking the plain of Vienna, form the transition to the Carpathians (now outside of Austrian territory). The Noric Alps include the Hohe Tauern and Niedere Tauern in the north, and the Karawanken on the southern border. The greatest lakes are the Lake of Constance and the Neusiedler See, at the two extremities of the country. The Alps enclose numerous mountain-lakes of great beauty. The scenery of the Salzkammergut and neighbouring regions is famous. The Danube crosses the north-eastern end of Austria, and, except Vorarlberg, which drains to the Lake of Constance and the Rhine (its western boundary), the whole country is within the Danube basin. The chief Austrian tributaries of the Danube are the Lech, the Inn, the Traun, the Enns, the March (on the Czechoslovak frontier), the Raab, and the Drave or Drau, with its tributary the Mur. The Danube and March are international waterways. The Inn is also navigable, and in a small way the Drave. Austria lost her sea-coast in 1919, but freedom of transit to Adriatic ports was accorded.

Mining has been an important pursuit in Austria for centuries; and though the chief mineral regions were lost by the Great War, Styria, Carinthia, and Salzburg remain. The most important minerals are iron and coal (lignite and some anthracite). Iron is got in Styria, Carinthia, and Salzburg; coal in Lower Austria; lignite in Styria and Upper Austria. Salzburg is the chief copper-producing land. Carinthia has lead and zinc. Salt is prepared at great saltworks at Ebensee, Aussee, Hallstadt, Ischl, and Hallein in and around the Salzkammergut, and at Hall in Tirol. Some of these names indicate the antiquity of the industry. Some gold is got in Salzburg. Styria has graphite. The other minerals include silver, marble, building-stone, kieselguhr, and mica. There are mineral springs at Gastein, Baden-bei-Wien, and elsewhere, but most of the famous resorts of the empire are now in Czechoslovakia.

Vines and maize are grown wherever conditions are favourable; and wine is made. The principal crops, however, are potatoes (in the higher regions the staple food), rye, oats, and wheat. Horticulture is carried to great perfection; and the orchards of Upper Austria, Styria, and Tirol produce a profusion of fruit. Cider is made in Upper Austria and Carinthia. Flax, hemp, beet, and tobacco are widely grown. The forests, which are very extensive, yield, besides timber, many secondary products, as tar, potash, charcoal.

Bears, wolves, and lynxes are found; wild goats in the highest, chamois and white Alpine hare in the middle, belts of the mountains. There are productive fisheries in the Danube and other streams and lakes. Considerable attention has been given to horse and cattle rearing, and dairy-farming is of some importance.

Manufactures include iron and steel goods, alloys, machinery, vehicles, musical and scientific instruments, textiles (cotton, woollen, flax, hemp), paper, pottery, wooden wares, chemicals.

In respect of commerce Austria is most unfavourably situated. High mountains oppose great obstacles to communication, and separate the producing districts from the nearest sea; while the great navigable river has its lower course in other countries. Since 1809 a great number of highways have been made. The Semmering (q.v.) road is a remarkable construction, but in height it is far exceeded by the Stilfserjoch or Stelvio Pass (Italian since 1919), across which the Austrian government in 1820–25 made the highest of all the Alpine carriage roads. More remarkable still are the railways over the Semmering (1850–53) and Brenner (1867). The Arlberg tunnel in 1884 brought the remote Vorarlberg into closer relations with the rest of Austria; and the Tauern tunnel, about 4000 feet above sea-level and over 5¼ miles long, opened in 1909, gave direct communication between Salzburg and Carinthia. By help of these and other lines connecting the east-and-west valley routes, the Austrian government has since 1841 covered the country with a tolerably complete network of railways, amounting to about 4000 miles. River communication received a great impulse from the introduction of steam. The Danube Steam Navigation Company was formed in 1850. For the commissions for the management of navigation, see

DANUBE. The canal system is not extensive. Canals to connect the Danube with the Rhine, Elbe, Oder, and Vistula have been projected, but political changes have made their prospects very uncertain. The Vienna and Neustadt Canal in Lower Austria has a length of 40 miles.

A great many political impediments to commerce were removed or diminished during the 19th century. The customs boundary between Austria and Hungary was done away in 1851, and in 1852 Austria passed from a prohibitive to a protective system. The customs union broke up with the Dual Monarchy, leaving the economic relations of the succession states in confusion.

Before the dismemberment of the empire Austria's population was more than half Slav. In 1910, out of 28½ millions, there were 6½ million Czechs and Slovaks, 5 million Poles, 3½ million Ruthenians, 1¼ million Slovenes, ¾ million Serbo-Croats, or 17 million Slavs in all. Germans were the most numerous single nationality, with 10 millions. Of a million Latins, three-fourths were Italians, Ladins, and Friulians; the remaining fourth, Rumanians. Since 1919 Austria has been almost purely German; and much even of German-speaking Austria went to Czechoslovakia, Italy, and Yugoslavia. Race and language, however, do not coincide. The Austrian population is darker and more round-headed than the north German. Probably it is in the main a mixture of the Alpine and Northern races of man. The German spoken by the Austrians is of the 'Oberdeutsch' dialects of the adjoining parts of Germany—Bavarian-Austrian for the most part, Alemannic-Swabian west of the Lech and the upper Inn. For literature and educated conversation, of course, ordinary standard German is used, though there is also a dialect literature. The literature of Austria has often a point of view or a flavour of its own, as, for example, in the drama of the 20th century. See GERMANY (*Language and Literature*). Some of the greatest German musicians have been Austrians, as Haydn, Mozart, Schubert; while others such as Gluck, Beethoven, Brahms, and Strauss settled in Vienna for longer or shorter periods. Among painters, Makart, Defregger, and Klint are well known. The great bulk of the people is Roman Catholic. There are two archbishops (Salzburg and Vienna) and four bishops.

Education is compulsory generally from the age of six to fourteen. There are some 5000 public and private elementary schools, with 700,000 pupils; 145 gymnasia and realschulen, with 45,000 pupils. Austria has three universities—Vienna, Gratz, and Innsbruck. There are polytechnics at Gratz and Vienna. Salzburg has a Catholic, Vienna a Protestant, faculty of theology. Vienna is famous for its art collections and learned academies, notably the Academy of Sciences. The chief libraries are the National (formerly Imperial) and the University Library at Vienna.

Constitution.—Before the revolutions, secessions, and partitions of 1918–19, when the Austrian Empire, under the sovereignty of the Hapsburg family, was one of the components of the Austro-Hungarian Monarchy (see AUSTRIA-HUNGARY), the Reichsrat consisted of an upper and a lower house. The former (Herrenhaus) was composed of princes of the imperial family, hereditary nobles, archbishops, bishops, and about 150 to 170 life members nominated by the emperor. Under the law of 1907, the last of a series modifying the constitution of 1861, the 516 members of the lower house (Abgeordnetenhaus) were elected for six years by equal, direct, and universal male suffrage. Electoral districts were as far as possible arranged to be of uniform nationality.

On the 12th of November 1918 the republic was proclaimed. A National Constitutional Assembly met in 1919; all titles of nobility were abolished; and in October 1920 a new constitution was adopted. The republic is a confederation of autonomous lands, with Vienna (detached from Lower Austria) as federal capital. The National Council (Nationalrat) of 175 members is chosen for four years by universal secret direct vote, by the system of proportional representation. The provincial diets, single-chamber bodies elected in like manner, choose the members of the Federal Council (Bundesrat) in proportion to population. Its powers are advisory. The National and Federal Councils form the National Assembly, and jointly elect the president, who holds office for four years. The federal chancellor, vice-chancellor, and ministers are elected by the National Council. All Austrians (male or female) over the age of twenty have the suffrage, and all over twenty-four are eligible. All citizens have equal rights. Each commune has an elected council, which chooses a burgomaster from its own members.

Army and Navy.—For the Austro-Hungarian army and navy before the dissolution of the Monarchy, see AUSTRIA-HUNGARY. The treaty of Saint-Germain (1919) abolished compulsory service, and limited the army to 30,000 in all. Officers serve for twenty years, non-commissioned officers and men for at least twelve, including six with the colours. The seaboard being lost, Austria's navy is naturally restricted to a few small river craft.

History.—The empire of Austria arose from the smallest beginnings at the end of the 8th century. In 796 a Margraviate, called the Eastern Mark (i.e. 'March' or frontier-land; see MARCHES, MARQUIS), was founded as an outpost of the empire of Charlemagne, in the country between the Ens and the Raab. The name *Oesterreich* appears first in 996. In 1156 the mark was raised to a duchy; and after coming into the possession of the House of Hapsburg in 1282, it rapidly rose to a powerful state. The princes of that House extended their dominion by marriage, by purchase, and otherwise, over a number of other states, and from 1438 held almost without interruption the throne of the German empire. By the acquisition (1526) of the crowns of Bohemia and Hungary, Austria rose to the rank of a European monarchy. In 1804 Francis declared himself hereditary Emperor of Austria, and two years afterwards resigned the title of Emperor of Germany and King of the Romans.

In the earliest times, what was later the duchy of Austria was inhabited by the Taurisci, a Celtic people; but their name subsequently disappeared before that of the Norici. After the conquest of the Norici by the Romans (14 B.C.), the country to the north of the Danube belonged to the kingdom of the Marcomanni; on the south of the river lay the Roman provinces of Noricum and Pannonia, in which last was the municipal city of Vindobona (Vienna). Tirol formed part of Rhætia. All these boundaries were swept away by the irruption of the northern peoples; and the regions in question were occupied in succession, during the 5th and 6th centuries, by Boii, Vandals, Goths, Huns, Lombards, and Avars. After the Lombards had settled in Italy, the Ens, about 568, became the boundary between the Bavarians and the Avars. In 796 the armies of Charlemagne destroyed the Avars, and as a bulwark of his empire in that quarter, established the East Mark, which formed the nucleus of the Austrian empire, just as the mark of Brandenburg grew into the modern Prussia. The East Mark was at first of small and varying dimensions. Early in the 10th century it was almost effaced by the Hungarians, then newly arrived in their present seats; but Otto I. having

defeated them in the battle of Augsburg (955), reunited the country to Germany.

In 983 Otto appointed Leopold of Babenberg margrave of the reconquered province, whose dynasty ruled Austria for 260 years. Under Henry Jasomirgott (1141–77), the Mark above the Ens was annexed to the Lower Mark, the united province raised to a duchy, and important privileges conferred on the newly-named duke and his heirs. This Henry Jasomirgott took part in the second crusade; and he was one of the founders of Vienna. Under his successors, large additions (Styria, Carniola) were made to the possessions of the House. Leopold VI. undertook numerous expeditions against the Hungarians and the Mussulmans, and is reckoned the best of the Babenberg princes. The line became extinct with his successor, Frederick, who fell in battle with the Magyars (1246).

Then followed an interregnum from 1246 to 1282. The Emperor Frederick II. at first treated the duchy as a lapsed fief of the empire; but in the distracted condition of affairs, the Estates of Austria and Styria chose Ottokar of Bohemia as duke, who made good his nomination about 1260. Ottokar, refusing to acknowledge Rudolf of Hapsburg as emperor, was defeated, and lost his life and possessions, in the great battle of the Marchfeld (1278); and the emperor elect, as head of the Holy Roman Empire, shortly afterwards (1282) bestowed the vacant fiefs of Austria, Styria, and Carinthia on his sons Rudolf and Albert. These duchies were afterwards united in the possession of Albert.

From the year 1282 the House of Hapsburg ruled Austria, and was associated with all its greatness and vicissitudes from that time to 1918. Albert, the first duke of the line, had many difficulties to contend with, especially among his subjects, who insisted on their old privileges, but he energetically asserted his authority. He was murdered in 1308 by his own nephew. Of his five sons, Frederick was chosen (1314) by a party to the imperial throne, but was defeated (1322) by his rival, Louis of Bavaria. Duke Leopold was defeated at Morgarten (1315) in his attempt to reduce the Swiss cantons that had thrown off their allegiance to Albert I. In 1330 Albert II., another of the sons of the first Albert, succeeded to the duchy, and considerably increased the possessions of the House. After his death (1358), two of his sons, Rudolf and Albert III., successively followed in the duchy of Austria. Another son, Leopold, held the other lands, but lost his life at Sempach, in seeking to regain the Hapsburg possessions in Switzerland. The posterity of Albert III. and Leopold respectively formed the two lines of Austria and Styria. During Albert III.'s reign, Tirol and other districts were ceded to Austria. After his death (1395) the dukedom was held by his son, Albert IV. Albert V., who succeeded his father in 1404, by marrying the daughter of the Emperor Sigismund, succeeded (1438) to the thrones of Hungary and Bohemia, and was at the same time raised to the dignity of German emperor, as Albert II. After his death in 1439, Bohemia and Hungary were lost to the House of Austria; but the imperial dignity was henceforth associated with it. With Ladislaw, Albert's son, the Austrian line of the House closed (1457), and their possessions went to the Styrian line. Of this line was the Emperor Frederick III., who raised the dignity of his House by making Austria an archduchy. Through the death of the other members of the House, Frederick succeeded in uniting the domains of Austria, curtailed, however, by the loss of the family possessions in Switzerland. He was succeeded in 1493 by his son Maximilian I.

The rise of Austria and of the House of Hapsburg to historical eminence may be said to date from the reign of Maximilian I. (1493–1519). By marrying Mary, daughter of Charles the Bold (1477), he acquired possession of the Netherlands. Through the marriage of their son Philip with Joanna of Spain, the Houses of Austria and Spain were united. As Philip died in 1506, his elder son, the celebrated Charles V., became heir to the united monarchies, and was elected emperor of Germany in 1519. Thus, by a succession of fortunate marriages, the House of Hapsburg became the most powerful dynasty in the world. This stage, at least, of Austrian history entirely justifies the well-known line:

Bella gerant alii; tu felix Austria, nube.*

Charles V., however, resigned all his German territories to his younger brother, Ferdinand I., who was thus the continuation of the Austrian branch of the line. Under Ferdinand the power of Austria greatly increased, for circumstances were now to put her into the dangerous but honourable and finally powerful position of bulwark of Christian Europe against the Turks. Ferdinand had married the sister of Louis, king of Bohemia and Hungary, and when Louis fell in the disastrous battle of Mohacz (1526), he claimed both these kingdoms. His claim to Hungary was contested by John Zapolya, who secured the aid of the great Turkish Sultan Soliman, the victor of Mohacz. Soliman accordingly invaded Hungary with a powerful army, and crushing all resistance, marched as far as Vienna, but failed in his siege of the capital (1529). Only a small part of Upper Hungary remained with Ferdinand, the rest of the country being subject to Turkey till near the close of the 17th century. Even the portion of Hungary that he held was a precarious possession, for which in 1547 he promised to pay an annual tribute of 30,000 ducats. On the abdication of Charles V. (1556), Ferdinand succeeded to the imperial dignity; he died in 1564, with the reputation of a good ruler, one strongly conservative of everything established, though he introduced the Jesuits. During his reign, however, the Reformation had made wonderful progress in the Austrian states.

In the partition of the inheritance that took place among Ferdinand's three sons, the eldest, Maximilian II., received the imperial crown along with Austria, Hungary, and Bohemia; the second, Ferdinand, Tirol and Upper Austria; the third, Charles, got Styria, Carinthia, &c. Maximilian was more fortunate in Hungary than his father. The death of Soliman before Szigeth (1566) led to a truce; Maximilian had his eldest son, Rudolf, crowned king of Hungary in 1572, and shortly after, of Bohemia, and also chosen king of the Romans. But his attempt to bring the crown of Poland into his House failed. Maximilian II. was fond of peace, tolerant in religion, and a just ruler. He died in 1576; and of his five sons, the eldest, Rudolf II., became emperor. Under him, the possessions of the Archduke Ferdinand of Tirol, who had married Philippine Welser, the beautiful daughter of an Augsburg burgher, reverted to the other two lines, Ferdinand's children not being considered noble. Rudolf II. was negligent, leaving everything to his ministers and the Jesuits. His war with the Porte and Transylvania brought him little credit; and the Protestants of Bohemia, oppressed by the Jesuits, extorted from him a charter of religious liberty. In 1608, he was obliged to cede Hungary, and, in 1611, Bohemia and Austria, to his brother Matthias. Matthias, who became emperor in 1612, ceded Bohemia and Hungary to his cousin Ferdinand, son of the

* Let others war; do thou, Austria, make fortunate marriages.

Archduke Charles of Styria, third son of Maximilian II. Matthias lived to see the outbreak of the Thirty Years' War (q.v.), and died in 1619.

Bohemia refused to acknowledge his successor, Ferdinand II. (q.v.), to whom all the Austrian possessions had again reverted, and chose the Elector Palatine, Frederick V., the head of the Protestant Union, as king. This election gave the signal for the Thirty Years' War (q.v.), in which the House of Austria took the lead, both as the champion of Catholicism, and the head of a power which aimed at universal domination in Germany and in the Christian world. The battle of Prague (1620) subjected Bohemia to Ferdinand, who formally set about rooting out Protestantism in that country and in Moravia. The emperor also succeeded in extorting acknowledgment of his sovereignty from the States of Austria; and here, too, Protestantism, which had made great progress since the time of Luther, was mercilessly suppressed. Under Ferdinand's successor, the Emperor Ferdinand III. (1637–1657), Austria continued to be a theatre of war; and at the peace of Westphalia (1648), had to cede Alsace to France. Ferdinand III.'s son and successor, Leopold I., provoked the Hungarians to rebellion by his severity. Tekeli (q.v.) received aid from the Porte, and Kara Mustapha besieged Vienna (1683), which was rescued only by an army of Poles and Germans under John Sobieski hastening to its assistance. After this great deliverance of Vienna, the Turkish power continually declined. In 1686 they lost Buda, after having occupied it for nearly 150 years. Repeated defeats from the Austrian troops under Louis of Baden and the famous Prince Eugene compelled them to submit to the treaty of Carlowitz (1699), by which they were almost entirely cleared out of Hungary, Transylvania, and Croatia, and the Hapsburg dominions advanced nearly to their ultimate frontiers. The struggle between Leopold and Louis XIV. of France for the heirship to the king of Spain, led to the war of the Spanish Succession (q.v.), during which Leopold died in 1705. He was of sluggish phlegmatic character, and wholly under the influence of the Jesuits.

His eldest son and successor, the enlightened Joseph I. (q.v.), continued the war. He died childless in 1711, and was succeeded by his brother, Charles VI. The peace of Rastadt, which concluded the war of the Spanish Succession in 1714, secured to Austria the Netherlands, Milan, Mantua, Naples, and Sicily. In the following years, its power on the Lower Danube was extended by the great victories of Prince Eugene, who completely defeated the Turks, took Belgrade, and compelled them to accept the disadvantageous peace of Passarowitz (1718). But these advantages were lost in a subsequent war, concluded by the peace of Belgrade (1739), when that fortress and other conquests of Eugene were restored to Turkey.

With the death of Charles VI., in 1740, the male line of the Hapsburgs became extinct, and his daughter, Maria Theresa, who was married to the Duke of Lorraine, assumed the government. For many years it had been the aim of Charles to secure the adhesion of the European powers to the Pragmatic Sanction, by which the possessions of the Austrian crown should pass to Maria Theresa. Those powers during his lifetime had promised to second his wishes, but he was no sooner in his grave than nearly all of them sought to profit by the accession of a female sovereign. A great war arose, in which England alone sided with Maria. Frederick II. of Prussia conquered Silesia. The Elector of Bavaria was crowned king of Bohemia, and elected emperor as Charles VII. in 1742. The Hungarians, however, stood by their heroic queen, who was soon able to wage a fairly successful war against her numerous foes. At the general peace of Aix-la-Chapelle in 1748, the power of Austria remained unbroken, except that it had been obliged to give up Silesia to Prussia, and a few districts of Northern Italy to her rivals there. At the death of Charles VII. in 1745, the husband of Maria Theresa was elected emperor of Germany as Francis I. The empress-queen, however, was not content with the loss of Silesia, and in 1756 entered into alliance with France, Russia, Saxony, and Sweden against Frederick. The result of the Seven Years' War (q.v.), which now ensued, was to confirm Prussia in the possession of Silesia. At Francis's death (1765), his son, Joseph II., became German emperor, and joint-regent with his mother of the hereditary states. Collateral branches of the House of Austria sprang from the younger sons of Maria Theresa, the Archduke Leopold in Tuscany, and the Archduke Ferdinand, who married the heiress of Este (see MODENA). In the first partition of Poland (1772), Austria acquired Galicia and Lodomeria, and the Bukowina was ceded by the Porte in 1777. At the death of the empress in 1780, the monarchy had an extent of 234,000 sq. m., with a pop. of 24 millions, and a debt of 160 million florins. The administration of Maria Theresa was distinguished by unwonted unity and vigour, both in home and foreign affairs.

Her successor, Joseph II., was an active reformer in the spirit of the enlightened despotism of the times; though often rash and violent in his mode of proceeding. He introduced economy into every department, relaxed the censorship of the press, granted liberties and rights to Protestants, abolished a great number of monasteries, and revised the school system. His protective system of duties, though exhibiting his narrowness as a statesman, gave a start to native manufactures. But his reforming zeal and passion for uniformity excited opposition; the Netherlands rose in insurrection, and other disturbances broke out, which hastened his end (1790). He was succeeded in the government by his brother, the Grand-duke of Tuscany—as German emperor, Leopold II.—who succeeded in pacifying the Netherlands and Hungary. The fate of his sister, Marie Antoinette, and her husband, Louis XVI., led Leopold to an alliance with Prussia against France; but he died in 1792 before the war broke out. War was declared by France on his son, Francis II., the same year (see FRANCE). By the treaty of Campo Formio (q.v.), 1797, Austria lost Lombardy and the Netherlands, receiving in lieu the Venetian territory. In 1795, at the second partition of Poland, it had been augmented by West Galicia. Francis, in alliance with Russia, renewed the war with France in 1799, which was ended by the peace of Lunéville. It is needless to follow all the alterations of boundary that the Austrian dominions underwent during these wars. The most serious was at the peace of Vienna (1809), which cost Austria 42,000 sq. m. of territory, and 11 million florins of her revenue. It was in 1804, when Napoleon had been proclaimed emperor of France, that Francis declared himself hereditary emperor of Austria as Francis I. On the establishment of the Confederation of the Rhine, he laid down the dignity of German emperor, which his family had held for nearly four hundred years.

The humiliating peace of Vienna was followed (1810) by the marriage of Napoleon with the Archduchess Maria Louisa; and in 1812 Austria figured as the ally of Napoleon in his great campaign against Russia, but she did not give much active assistance. In August of the following year Austria joined the grand alliance against France;

and the Austrian general, Schwarzenberg, was intrusted with the chief command of the allied forces, which at the battle of Leipzig and in the campaign of 1814 broke the power of Napoleon. The sacrifices and great services rendered by Austria in the gigantic struggle received consideration at the treaty of Vienna (1815). As some recompense for the loss of the Netherlands she received Venice and Dalmatia, which afforded an outlet for her foreign trade.

After that time, Austria exerted a powerful influence in European politics generally, and more especially in the German Confederation, of which her emperor was president; and that influence was uniformly hostile to constitutionalism (see METTERNICH). The death of Francis I. in 1835 made little alteration in the policy of Austria; Ferdinand I. trod in his father's footsteps. The political alliance with Russia and Prussia was drawn closer by a personal conference of the emperor with Nicholas I. and Frederick-William III. at Teplitz in 1835. The wonted calm was interrupted in 1840 by the war against Ibrahim Pasha in Syria, in which Austria took part in union with England.

But during this long peace, the internal condition of the empire was coming to a crisis. The stifling bureaucratic system of government and police supervision had produced only irritation and discontent, and was powerless to keep down the fermentation. A Polish insurrection in 1846 led to the incorporation of Cracow with the monarchy. But the opposition to Austrian rule in Italy, Hungary, and Bohemia became uncontrollable; even in Lower Austria the Estates were among the foremost to urge reform in the direction of constitutionalism. In Austria, the revolutionary period of 1848–49 was one of exceptional severity, the movement for constitutional freedom being complicated by the revival of the national spirit in Hungary, Italy, and Bohemia. The time was everywhere ripe for revolt, when the fall of Louis-Philippe (February 24, 1848) gave the signal for the outbreak of the revolutionary elements all over Europe. Nowhere was the spirit of change stronger than in Vienna, which for many months became a scene of confusion. A period of addresses and petitions for liberal reform was, in March, followed by a popular movement in the capital, to which the government and military, after a feeble resistance, succumbed. The downfall of the old system was marked by the flight of Metternich to England, by the arming of the citizens, by the granting of the freedom of the press, and other popular measures. At the same time, the opposition in Hungary had carried their demand for an independent ministry responsible to a national diet, and the emperor was not in a position to withstand it. The 22d of March saw the insurrection break out at Milan, and Radetzky, the military commander, forced to retire on Verona. Venice rose at the same time, and drove out the Austrians. The Austrian power and system of government had in fact broken down.

The central power at Vienna was in a state of collapse, and the authority passed into the hands of the national guards and the students' legion (the *Aula*). Further troubles in the capital led to the flight of the court to Innsbruck. A Slavic insurrection broke out in Prague after Easter, which, however, was repressed with bloody severity by Prince Windischgrätz. While the emperor was lingering at Innsbruck, leaving Vienna in the power of the populace, and the Hungarians were pursuing an independent course, it was in Italy that the power of Austria began to recover ground. Radetzky had at first been reduced to maintain a defensive position at Verona, against the revolutionary forces led by Charles-Albert of Sardinia. But in the course of the summer he took the offensive against the Sardinians, and defeated them at Custozza. The fruits of the victory were the dissolution of Charles-Albert's army, and a truce which again delivered Lombardy to Austria.

In the meantime, the government at Vienna was more powerless than ever. The emperor remained at Innsbruck, and a constituent diet was opened in July by the Archduke John, as his representative. But order was never permanently restored, and affairs were brought to a crisis by the proceedings in Hungary. Jellachich, Ban of Croatia, refused obedience to the Hungarian government, a course which, while openly condemned, was secretly encouraged by the Austrian court. The Archduke Palatine, Stephen, left Hungary, after a last attempt at conciliation; and the emperor, who had returned to Vienna after repeated invitations, named Count Lamberg commissioner, with the supreme command in Hungary. Lamberg, however, was murdered on the bridge of Pesth (September 28). Though the dissolution of the Hungarian parliament was now declared, it continued its sittings, and appointed Kossuth president of the committee of defence. The leaders of the popular movement in Vienna were in sympathy with Hungary, and when the imperial troops were ordered to suppress the national rising there, the citizens again rose in insurrection. The arsenal was stormed, and the war-minister, Latour, murdered; the court fled to Olmütz, a committee of safety was appointed, the armed populace organised, and the Polish general, Bem, put at the head of military affairs. In the meantime, the military forces had withdrawn from the capital, and joined Jellachich, in order to prevent the Hungarians coming to the aid of the Viennese. Windischgrätz now laid siege to the capital, which surrendered at the end of October, after a resistance of eight days. The reaction was triumphant, and the leaders of revolt severely punished; but as Ferdinand had not shown sufficient vigour in the great crisis, he was persuaded to abdicate, and Francis-Joseph was declared emperor at the age of 18. Thus restored, the central authority had now to assert itself in Hungary and to complete the reconquest of Northern Italy. In the former country, the imperial troops had at first met with great success and retaken the capital, but they could not maintain themselves there. In Italy, Radetzky made his rapid and decisive campaign of 1849, and, by the victory of Novara, completed the overthrow of Sardinia. With the surrender of Venice, which took place in August, the subjugation of Italy was complete. At the same time, in the National Assembly at Frankfort, Austria opposed the project of a confederation of states under the leadership of Prussia, and managed to thwart the conferring of the empire of Germany on the Prussian king.

In Hungary, the Magyars, though the Germans and Slavs within the country itself were hostile to them, began the campaign of 1849 with decided success. Bem conquered Transylvania. These and other successes encouraged Kossuth to proclaim the deposition of the House of Hapsburg, and the re-establishment of Hungary as a separate state. Buda was retaken from the imperial troops, which were driven back on Presburg. But the government had already solicited the aid of Russia, whose armies, entering Transylvania and Hungary, added to the imperial cause the irresistible weight of numbers. Surrounded on every side by superior forces, the Hungarians were completely beaten. It was in vain that Kossuth transferred the dictatorship to General Görgei (q.v.). Görgei, whether from treachery, as the other Magyar leaders maintained, or from necessity, as he himself averred, laid down

his arms to the Russians at Vilagos (August 13). The surrender of Komorn, in September, completed the subjugation of Hungary, which was treated as a conquered country.

The ten years which followed on the revolutionary troubles of 1848 were a period of reaction and of absolutism. A constitution which had been granted in 1849 was soon annulled. The policy pursued was one of strong centralisation under a bureaucratic government, by which the claims of nationality and of freedom were alike disregarded. Liberty of the press and trial by jury were set aside. A rigorous system of police was maintained. The aim was to Germanise the whole empire and to crush the aspirations of both Slavs and Hungarians. As the Catholic Church pronounced against national freedom, and supported the central authority, it received the greatest privileges by the Concordat of 1855. The result of all these proceedings was only to irritate the national feeling in Hungary, Italy, and Bohemia. The finances, too, notwithstanding vigorous measures for improving the material resources of the country, continued in a bad state, so that incessant loans were required to cover the current deficit.

On the confused arena of German politics, the struggle for ascendency was kept up between Austria and Prussia. In 1850 the two powers were armed and ready to come to blows with reference to the affairs of Hesse-Cassel (q.v.); but the bold and determined policy of Schwarzenberg prevailed, and by the humiliating arrangement of Olmütz, Prussia gave way (see GERMANY). For a few years longer the preponderance of Austria in the German Confederation was secured.

During the Crimean war, Austria had a very difficult part to play. It felt its indebtedness on the one hand to Russia for help in the great crisis of 1849, on the other it could not without uneasiness see the development of Russian power in the Balkan Peninsula. It occupied the Danubian principalities with the consent of Turkey, but otherwise remained neutral in action. Yet its whole influence was thrown into the scale against Russia. The Crimean war was not brought to a termination without disclosing a power which was to break the Austrian domination in Italy. Under the leadership of Cavour, Sardinia had taken part in the war, and had again brought the Italian question to the front. The rule of Austria in Italy had always been unsatisfactory. From her own provinces in Venice and Lombardy she controlled the policy of the courts of Central and Southern Italy, and her influence tended invariably towards the suppression of national feeling and popular liberty. Sardinia was the only state that worthily represented the spirit of the Italian people. In the spring of 1859 it began to arm against Austrian supremacy. Austria demanded immediate disarmament, on pain of war; but Sardinia refused. Austria accordingly commenced hostilities by crossing the Ticino at the end of April 1859. Sardinia having secured the aid of France, the Austrians were defeated at Magenta, Solferino, and elsewhere, and their emperor was fain to seek an armistice from Napoleon. On the 11th July, the two potentates met at Villafranca, and concluded a peace, ceding Lombardy to Sardinia (see ITALY). Venice was all that still remained of the Italian possessions of Austria, except the Trentino and parts of the Adriatic coast regions.

The rivalry of Prussia and Austria for influence in the Germanic body of states dated from the rise of Prussia to be a leading power. The arrangement of Olmütz in 1850 had left a painful feeling of humiliation in the minds of Prussian statesmen. In 1864 the combined Prussian and Austrian forces drove the Danes out of Slesvick-Holstein, but the two victors quarrelled about the subsequent arrangements. War was declared, and in 1866 the Austrian armies in Bohemia were completely beaten by the Prussians, in a campaign of seven days, which closed with the great defeat of Königgrätz or Sadowa. The middle states of Germany which supported Austria were occupied by Prussia. Sardinia, which had formed an alliance with Prussia, was, however, defeated at Custozza. The result of the contest was to exclude Austria from Germany, and she had to hand over to Sardinia the province of Venetia, a cession by which she was all but excluded from Italy. Thus was Austria finally shut out from the scenes where for generations she had not unsuccessfully striven to uphold her supremacy. The sphere of development remaining to her was to be found in her own circle of states and in the East.

From the great war of 1866 to that of 1914, the history of Austria was concerned chiefly with two important interests. In the first place, the government had to attempt an arrangement of the conflicting claims and rights of the peoples constituting the monarchy; in the second place, it had to establish working relations with the great neighbouring powers, Germany and Russia, and especially with the latter on the Eastern Question. After the collapse of 1866, the most enlightened Austrian statesmen saw that the true policy of the empire could no longer consist in repressing national claims and constitutional freedom. During the last war, the feeling in Hungary had been lukewarm, and even actively hostile to Austria. The Saxon Count Beust, who was now called to be the head of the Austrian foreign office, advised that an understanding with Hungary was essential. The same policy found a firm and judicious advocate in Francis Deák, an influential Hungarian. The political independence of Hungary was recognised; and the emperor was crowned king at Pesth in accordance with the old historic rites (1867). Soon thereafter he sanctioned the decisions of the Hungarian Diet concerning the relations of the kingdom of Hungary with the other countries of the empire. Such was the famous *Ausgleich*, or agreement between Hungary and Austria Proper. For the dual system thus established, see AUSTRIA-HUNGARY. Within the territories of Austria Proper there followed a development of constitutional freedom. At the end of 1867 the first parliamentary ministry in Cisleithania was formed. The Concordat was set aside. Education was freed from the control of the Catholic Church. Marriage was placed under the jurisdiction of the civil power. The press laws were relaxed. The franchise reform of 1896, though it gave votes to nearly all males, retained the division into electoral classes. Socialism gained ground, and won universal male suffrage in 1907.

From the war of 1914–18 Austria emerged defeated and exhausted, obliged to acquiesce in the loss even of some of her German districts (central Tirol, the borders of Bohemia, &c.), and of course of her Italian, Slovene, Rumanian, Ruthenian, Polish, and Czech elements. Of her 'crown-lands,' Bukovina, Galicia, Silesia, Moravia, Bohemia, Carniola, Görz and Gradiska, Istria, Trieste, and Dalmatia were reft from her, with the greater part of Tirol, much of Styria, and the corners of Carinthia. On the other hand, part of German West Hungary (Burgenland) became Austrian; and Austria, with a democratic republican constitution (see above) and a homogeneous population, was freed from her most troublesome political problems. Economic difficulties, however, became very threatening. Vienna, one of the world's greatest cities, was a misfit as the capital of a small country, and cohesion between capital

and lands was wanting. Dr Michael Hainisch, a prominent writer on economic subjects, was elected president in 1920. Fears of monarchist troubles were allayed by the failure of the dethroned Kaiser Karl's two attempts to recover the crown of Hungary, and his death soon after. Attempts of Austria as a whole and of the lands separately to unite with Germany were vetoed by the Allies under French influence. Germany was compelled to change an article in her constitution that contemplated the future inclusion of Austria. After the Klagenfurt district, in accordance with the treaty of Saint-Germain, had decided by plebiscite to be Austrian, a Yugoslav force took possession, but withdrew under pressure from the allied powers. Another of Austria's neighbours, Hungary, resisted the fulfilment of the treaty by refusing to give up Burgenland. A compromise was at last agreed to, whereby a plebiscite was to be held in and around Oedenburg, and the rest of the region was handed over. The plebiscite was held under conditions which Austria could not accept, and Hungary retained Oedenburg (1921).

Austria, LOWER, ÖSTERREICH UNTER DER ENNS, or NIEDERÖSTERREICH, a land of the republic of Austria, formerly a crown-land and archduchy of the Austrian Empire, includes the original Eastern Mark, or march, of the Germans against the Slavs from which Austria takes its name, and with Upper Austria came to form an archduchy which was the nucleus of the Austrian Empire. Vienna since the revolution has been detached, leaving an area of 7441 square miles, and a population (1923) of 1,480,449, nearly all Germans, with a few Czechs and others. The Danube crosses Lower Austria from west to east. North of its plains is hilly country, merging in the plateau of Moravia. The south is occupied by the eastern end of the Alps, rising to 6800 feet in the Schneeberg. Lower Austria has many manufactures, and is the most thickly peopled land of the republic. The towns include Wiener Neustadt, Sankt-Pölten, and Baden.

Austria, UPPER, ÖSTERREICH OB DER ENNS, or OBERÖSTERREICH, a land of the Austrian republic, formerly a crown-land and archduchy of the Austrian Empire, once part (with Lower Austria) of the archduchy of Austria, has an area of 4626 square miles, and a population (1923) of 876,074. The Danube separates a small northern mountainous region from the Alps. In the south the Salzkammergut projects between Styria and Salzburg. The land is fertile, rich in minerals (notably salt), and cattle-breeding, forestry, and metal and other industries are practised. There is much fine scenery. The capital is Linz; other towns are Steyr and Wels.

Austria-Hungary, one of the six great powers of Europe, had been at the time of its dissolution in 1918 for half a century organised as a Dual Monarchy, consisting of a German Cisleithan moiety (usually called the Austrian Empire, officially 'the kingdoms and lands represented in the Reichsrath') and a Magyar Transleithan (the Kingdom of Hungary in its wider sense, otherwise called 'the lands of the Crown of St Stephen' or 'of the Hungarian Crown'). To these a third region was added by the annexation of Bosnia-Herzegovina in 1908, but the monarchy remained dual notwithstanding the grant of a constitution to the new territory in 1910. The custom of speaking of the whole as 'Austria' was much resented by the Magyars, who pointed out that the regions on either side of the Leitha were associated on equal terms, that Vienna was no more the capital of Austria-Hungary than was Budapest, and that Austria's precedence was merely alphabetical. Towards the end, indeed, Hungary's political influence was on the whole stronger than Austria's for a time. Both Austria and Hungary had long been subject to the Hapsburgs before the Ausgleich of 1867 stabilised their relations to each other; but it is most convenient to deal with them in separate articles, to which the reader is referred for description and history. Further information may be sought in the articles on those states which were formed out of or augmented by the wreckage of 1918. The present article deals mainly with the history of Austria-Hungary in 1867–1918 and the forces that conditioned its existence.

In 1910, the date of the last census before its break-up, Austria-Hungary had a population of 51,340,378, and an area of 261,239 square miles, thus divided:

	Sq. Miles.	Population.
I. AUSTRIA—		
Lower Austria	7658	3,530,698
Upper Austria	4628	852,667
Salzburg	2763	214,997
Styria	8662	1,441,604
Carinthia	3989	394,735
Carniola	3845	525,083
Küstenland (Coastland): Trieste and territory	86	229,475
Küstenland (Coastland): Görz and Gradisca	1130	261,721
Küstenland (Coastland): Istria	1911	408,261
Tirol	10,302	946,498
Vorarlberg	992	145,794
Bohemia	20,065	6,774,309
Moravia	8584	2,620,964
Silesia	1988	756,590
Galicia	30,321	8,022,126
Bukovina	4033	801,364
Dalmatia	4956	646,062
Total for Austria	115,862	28,567,898
II. HUNGARY—		
Hungary Proper (including Transylvania and Fiume)	109,188	18,221,387
Croatia-Slavonia	16,421	2,619,291
Total for Hungary	125,609	20,840,678
III. BOSNIA-HERZEGOVINA	19,768	1,931,802
Total for Monarchy	261,239	51,340,378

The Austro-Hungarian dominions formed geographically a compact territory, with an area greater than that of any European state save Russia, and more than twice that of Great Britain and Ireland. The body of the monarchy lay in the interior of Europe, though it had about 500 miles of sea-coast on the Adriatic, not including the coasts of the numerous islands. Austria-Hungary bordered on Italy, Switzerland, Liechtenstein, Bavaria, Saxony, Prussia, Russia, Rumania, Serbia, Turkey (till the Balkan wars), and Montenegro. The Turkish provinces of Bosnia and Herzegovina, thenceforward occupied and administered by Austria, were annexed by proclamation in 1908, when the Sanjak of Novi-Bazar, which had been in military occupation, was restored to Turkey.

The military system of Austria-Hungary resembled that of Germany under the empire, but differed on account of the dual nature of the monarchy. The common army was administered by the Common War Office, of which the Common War Minister was at the head; but the Austrian Landwehr and Landsturm were in charge of the Austrian and the corresponding Hungarian forces of the Hungarian Defence Minister. Each of these five bodies had its Ersatz. Bosnia-Herzegovina had no Landwehr. Military service was compulsory, and usually began about the age of twenty. After two or three years with the colours, either in the common army or, if its numbers were completed, in the Landwehr, men passed to the Landwehr reserve (Bosnians to the common army reserve). Those not required for common army or Landwehr went at once to the Ersatz. In all cases after twelve years' service men passed to the Landsturm, and remained to the age of forty-two.

The navy was chiefly a coast-defence force, with a flotilla on the Danube. It was administered by

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the Common Ministry of War, and recruited partly voluntarily, partly by a levy on the seafaring population. The men had four years of active service, five in the reserve, and three in the Seewehr. The headquarters of the fleet were at Pola. There was an arsenal at Trieste, and there were various other establishments on the Dalmatian coast.

In foreign affairs Austria-Hungary's chief aim was to find a *modus vivendi* with Germany and Russia, and after 1871 Bismarck arranged between Germany, Austria, and Russia a 'Three-Emperors-Alliance' (Dreikaiserbund). After the Russo-Turkish war of 1877–78 it was superseded by an alliance between Germany and Austria, which in 1882 became the Triple Alliance by the accession of Italy, in spite of the *Italia Irredenta* difficulty. The German alliance was of use in the crisis that arose when Count Aerenthal, after the Turkish revolution of 1908, annexed the Turkish provinces of Bosnia and Herzegovina, which the treaty of Berlin had placed under Austro-Hungarian administration in 1878. When the growing strength of Austria-Hungary's neighbour Serbia led at last to war in 1914, the allies of both were involved, but Italy seceded. Both Italy and Rumania, divided in their interests, intervened against Austria-Hungary. See WORLD WAR.

The population embraced a greater number of peoples, distinct in origin and language, than that of any other European country except Russia. The Slavs were collectively the most numerous, amounting to nearly half. They formed the bulk of the population of Bohemia, Moravia, Galicia, Carniola, Dalmatia, Croatia, Slavonia, Bosnia-Herzegovina, the Voivodina, and the north of Hungary. They were, however, split up into a number of peoples, differing greatly in language, religion, culture, and manners; so that their seeming preponderance was lost. The chief branches of the Slav stem were, in the north, Czechs or Bohemians (the most numerous of all, including the Slovaks), Poles, and Ruthenians; and in the south, the Slovenians and Serbo-Croatians (together called Yugoslavs or South Slavs). The Germans numbered above one-fourth, dispersed over the monarchy, but predominating most in Lower and Upper Austria, Salzburg, Tirol, Styria, Carinthia, and the west of Hungary (Burgenland, now mostly Austrian), with isolated colonies, of which the largest were in Transylvania and around Gottschee. The Romance peoples amounted to fully 8 per cent., and were divided into western and eastern. The western consisted of Italians, inhabiting the south of Tirol, western Istria, and parts of Dalmatia; the Ladins (Latins), occupying some valleys in Tirol; and the Friulians about Görtz, north of Trieste. The eastern Romance people were the Rumanians, in Transylvania, Hungary, the Voivodina, and the Bukovina. The Magyars, or Hungarians proper, numbered about one-fifth, located chiefly in Hungary and Transylvania. The small remaining portion was composed chiefly of Jews, Armenians, and Gipsies.

The literature of the principal languages will be found discussed under GERMANY, HUNGARY, CZECHOSLOVAKIA. See also ITALY, POLAND, RUMANIA, RUTHENIANS, SERBIA, SLAVS.

Austria-Hungary was a monarchy hereditary in the House of Hapsburg-Lorraine. In the case of the reigning family dying out, the states of Bohemia and of Hungary had the right of choosing a new king; but for the other crown-lands, the last sovereign was to appoint his own successor. The reigning house must profess the Roman Catholic faith.

Till 1848 Hungary and Transylvania had a constitution limiting the monarchy, which was absolute elsewhere; though the several provinces had each its consultative council composed of clergy, nobles, and burghers. After the Revolution of 1848, and the subsequent reaction, all marks of independence of the separate provinces disappeared. The imperial constitution granted March 4, 1849, and the provincial constitutions that followed, were abolished, and government was organised in the most absolute form by the imperial letters-patent of December 31, 1851. The different provinces of the monarchy were divided into circles, the chiefs of which were nominated by the central authority. All the machinery of a free and constitutional government was set aside. In order to support itself in this course, the government had to seek aid from the Catholic Church, with which it established the concordat of 1855. By this agreement with Rome Catholicism became a privileged religion, with control of education and of the censorship of books. Thus the reaction was complete. Of the reforms of 1848 there remained only one of importance, the abolition of serfdom.

After the loss of most of the Italian provinces (see AUSTRIA, ITALY), a constitution for the whole of the Hapsburg dominions was tried in 1861, but failed in face of opposition from Magyars, Czechs, and others. Then came the defeat of Austria by Prussia, which meant not merely loss of Venice, but a new orientation of external policy, and an altered balance among the several nationalities within her borders. It was necessary to come to terms with the Magyars. This was done by the famous *Ausgleich* of 1867, which organised Austria-Hungary as a Dual Monarchy, with Germans predominant in the Austrian Empire, and Magyars in the Apostolic Kingdom. Each of the two states had its own laws, parliament, ministers, and government. Besides the sovereign there was a link in the Delegations, practically committees of the two parliaments, which deliberated independently, communicated in writing, and met in Vienna and Budapest alternately. The Delegations controlled foreign affairs, army and navy (but not the Landwehr and levy-in-mass), and finance connected with common affairs. To the common finance minister was afterwards assigned the administration of Bosnia-Herzegovina. The proportion in which the two countries contributed to common expenses was negotiated periodically by 'quota-deputations,' but the money was voted by the two parliaments separately. Practically Austria-Hungary formed a customs union (including Liechtenstein, but excluding certain small border districts in the west); but this arrangement had to be renewed every ten years, not without wranglings and unconstitutional makeshifts. From 1897 especially, the Hungarians contended that their contribution to common revenue was unduly great. From 1903 onwards Hungarian separatism became so menacing that, after a series of deadlocks and crises, the government threatened by franchise reform to submerge the Magyar oligarchy, which, loud in its cries for freedom for the Magyars, had long sought to Magyarise the Slavs, Germans, and Rumanians under the crown of St Stephen. Nevertheless the old illiberal system continued. In Austria, however, the advance of Socialism amidst the welter of conflicting nationalisms helped to achieve universal male suffrage in 1907. Austria, moreover, had meanwhile made such concessions to the Slavs that it was no longer so predominantly German as Hungary was Magyar in government. The Poles naturally showed less inclination to turn their eyes towards Russia than the other Slavs; indeed, the Poles were better pleased, the hope of independence being remote, with the Austrians than with their other masters; and they were kept out of mischief by having a free hand in Galicia to keep the Ruthenes under.

Even so, the Ruthenes were better off than their kindred in Russian Ukraine. The Czechs insisted on the old historic rights of the kingdom of Bohemia, but without success; for, besides other reasons, the question was complicated by the large German population of Bohemia. Thus an attempt at federalism in 1871 failed, though the restoration of the kingdom of Bohemia and the coronation of the emperor-king at Prague had been promised.

But the great weakness of the Monarchy was in the south. The Serbo-Croats, divided among Austria (Dalmatia and Istria), Hungary (Voivodina, Croatia, and Slavonia), Austria-Hungary jointly (Bosnia-Herzegovina, till 1908 nominally Turkish), the two independent states of Serbia and Montenegro, and Turkey (Old Serbia), became more and more conscious of Serbo-Croat nationality, with or without the Slovenes. Union of the South Slavs seemed more practicable within the Monarchy than without, and Trialism (the turning of the Dual into a Trial Monarchy, with its third capital at Agram) seemed to gain ground against Pan-Serbism. Moreover, the closing of westward doors by the disastrous wars against Italy and Prussia had turned Austria-Hungary's face towards the south-east, where Serbia blocked the way. The occupation of Bosnia-Herzegovina in 1878 was a move against the Serbs. Its annexation, hastened by the Turkish revolution of 1908, was a blow to Pan-Serbism. Oppression in Croatia was intensified. The Balkan wars of 1912–13 eliminated Turkey and aggrandised the Serb kingdoms, though by the erection of an independent Albania Austria succeeded in keeping them practically blocked out from the sea.

Trialism found some favour with the Czechs as a step towards federalism; the Germans were coming to look upon it as a means of ridding Austria of its Slav majority; and it was understood to be the Archduke Franz Ferdinand's intention to try it when he should succeed to the throne. The connection of these facts with the archduke's murder at Serajevo is obscure. Austria-Hungary's part in the war that ensued is dealt with in the article thereon. During the war repression drove the Yugoslavs to the Pan-Serbian solution of their problem. Imprisonment and internment were met by flight and by wholesale surrenders and desertions to the enemy. Serbia became the kingdom of the Serbs, Croats, and Slovenes. Czechoslovaks also went over in great numbers. Their anti-Bolshevik adventure in Siberia helped to win them recognition as a nation on the part of the Allies. This was withheld from the Ruthenians, who were left subject to Poles, Czechoslovaks, and Rumanians. The Poles, promised independence by all parties, formed a united republic. Rumania and Italy obtained their *irredenta* territory, with considerable foreign minorities, Fiume falling ultimately to Italy (1924). The Hapsburg monarchy did not long survive Franz Joseph, who died in 1916. Peace was made separately with the Austrian republic and with a much-curtailed Hungary, which, though it soon declared itself to be a kingdom, refused to receive back Karl, the last of the Hapsburg king-emperors.

Austrian Succession. See SUCCESSION WARS.

Autacoids. See HORMONES.

Auteuil, formerly a country village at the entrance of the Bois de Boulogne, now part of Paris. Boileau and Molière lived there. It has a well-known racecourse.

Authentic Modes, church modes having all sounds within the octave of the final or keynote. In the Plagal Modes founded on them the range is from the fourth below to the fifth above the final.

Auto (Sp. and Port. from Lat. *actus*, 'act'), a word specially applied to the religious plays of Spain and Portugal from the Middle Ages onward, similar to the English miracles and moralities. The *auto sacramental* was a Eucharistic representation, connected from the 13th century with the celebration of Corpus Christi. Liturgical in origin, like the English drama, the Spanish drama had a parallel development, but the religious type survived alongside later forms. The autos sacramentales became elaborate popular allegorical plays, combined with farcical interludes. They were written in Portugal by Gil Vicente, in Spain by Juan de Encina, Lope de Vega, Calderón, and Gabriel Téllez. Their representation was forbidden in Spain in 1765, but continued in Portugal and Spanish America.

Autobiography. See BIOGRAPHY.

Autoch'thones, the Greek name for the original inhabitants of a country, not settlers, considered as having sprung from the soil itself. The Athenians were fond of being so called; the ancients counted also among autochthonous races the Arcadians, Latins, Gauls, and Scythians. The Latin equivalent term was *aborigines*.

Auto'cracy is that form of government in which the sovereign unites in himself the legislative and the executive powers of the state, and thus rules uncontrolled, or but little controlled, by constitutional restraints, or the recognised authority of councils or parliaments. All truly 'oriental' governments were of this type; in European countries the absolutism of the sovereign has been everywhere balanced or regulated in some way, if not abolished. In Russia, where the sovereign actually called himself 'Autocrat,' almost pure autocracy lingered longest. But even the most rigorous autocrat must in practice have regarded the convictions, prejudices, or intrigues of his advisers and officials, his nobles, his court, his bureaucracy. There are real though not formal checks. In autocratic states, palace or court revolutions are not infrequent. See ABSOLUTISM, FEUDALISM, GOVERNMENT.

Auto da Fé (Port., 'act of the faith;' Span. *Auto de Fé*) was the name given to the solemnity that from 1481 used to take place in Spain and Portugal at the execution of heretics condemned to death by the Inquisition. It was generally held on a Sunday between Whitsunday and Advent, very often on All-Saints' Day. At dawn, the dismal tolling of the great bell of the church gave the signal to begin the drama of the day; for as such it was looked upon by the people, who thronged to it in troops, believing that they did a good work in merely looking on. Men of the highest rank reckoned it prudent to give their countenance to the 'holy' tribunal at these processions, and even grandees of Castile did not disdain to make themselves familiars of the Inquisition. The procession was led by the Dominicans, carrying the flag of the Inquisition; next followed the penitents, on whom only penance had been laid; behind them, and separated by a great cross which was borne before, came those condemned to death—barefoot, clad in robes painted with hideous figures called the Sanbenito, and with a pointed cap on the head; then, effigies of fugitives; and lastly, the bones of dead culprits, in black coffins painted with flames and hellish symbols. The frightful train was closed by an army of priests and monks. The procession went through the principal streets to the church, where, after a sermon on the true faith, the sentence was announced, the accused standing meantime before a crucifix with extinguished torches in their hands. After the sentence had been read to them, an officer of the Inquisition gave each of the condemned a blow on the breast

with his hand, as a sign that they were given over by that tribunal to the secular power; on which a secular officer took them in charge, had them fettered, and taken to prison. A few hours afterwards, they were brought to the place of execution. If they yet, at the last, made profession of the Catholic faith, they were so far favoured as to be first strangled; otherwise, they were burned alive, and with them the effigies and bones of the fugitive and dead culprits. As a rule, the king, along with his whole court, had to exalt by his presence the solemnity of the horrid transaction. The most splendid auto da fé took place at Madrid, under Charles II., in 1680; and so late as 1826 a Jew and a deistical schoolmaster were, the one burned, the other hanged, under the forms of an auto da fé, at Valencia. See INQUISITION.

Au'tograph (Gr.), something written in a person's own handwriting, and not by an amanuensis, whether a mere signature or a whole manuscript, as opposed to a *copy*. From the 16th century onwards, but especially in modern times, the collection of autographs has become an object of eager pursuit; and consequently since 1801 they have formed a branch of literary trade. The value of autographs is determined by the interest felt in the writer, the scarcity of such relics of him, and the contents of the writing. Besides portraits of famous persons, we naturally wish to possess a specimen of their handwriting, as the peculiarity of the style—the physiognomy of the handwriting—completes our knowledge of their personality. The oldest autograph in the French archives is that of Thierry III., dating from the year 677. The British Museum has an unrivalled collection. The finest modern private collection was that of Mr Alfred Morrison, made in the years 1865–82, of which a descriptive catalogue in 6 volumes, with illustrative fac-similes, was printed in 1883-92. The best collection of American autographs was formed by Dr Emmet, and is now in the New York Public Library. Many private collections number from 5000 to 10,000 items. Forgery (q.v.) of autographs is not infrequent.

Autogravure, a peculiar process of photo-engraving patented by J. R. Sawyer, London, on November 12, 1884. If an ordinary autotype carbon print be placed on silvered copper instead of on paper, the slight relief which the picture possesses is enough to admit of an electrotype being taken from it. The raised parts of the print become the depressed parts in the electrotype. Impressions from the latter can therefore be taken in the same way as from an engraved copperplate. See ELECTRO-METALLURGY, PHOTOGRAPHY, AUTOTYPE.

Auto-intoxication, poisoning by substances produced within the body, whether ordinary waste-products, results of perverted metabolism, or substances produced by the action of bacteria.

Autol'ycus, (1) a son of Hermes, maternal grandfather of Ulysses. He lived on Mount Parnassus, and was famous for his cunning and robberies. Similarly, in Shakespeare's *Winter's Tale*, Autolycus is a 'snapper-up of unconsidered trifles.'—(2) A Greek astronomer and mathematician of Pitane in Æolia, about 330 B.C., who wrote two works, on the revolving sphere, and on the rising and setting of the fixed stars.

Automatic Machines. See AUTOMATON.

Automatic Writing, or writing produced without the volition of the writer, has been by many considered a communication from the dead, or from other disembodied spirits. Such literature has often, therefore, had a high value set upon it as a revelation, a value often very disproportionate to its intrinsic worth. The study of the unconscious mind gives another explanation; and of that mind it does indeed reveal much. In some cases telepathy may be at work. See PLANCHETTE.

Automatism (Gr., 'self-movement'), a term applied to the power of initiating vital processes from within the cell, organ, or organism, independently of any direct or immediate stimulus from without. External conditions produce effects within the living matter which may lie dormant for a time, and only subsequently find expression in activities without apparent external stimulus. The heart of a cold-blooded animal like a tortoise may be isolated from the body without interrupting the beat, which will indeed, in certain conditions, continue for days; the conditions of its activity are contained within itself—it is automatic. The highest form of automatism is that exhibited in the will of man and the higher animals—they can act without direct interference from without. But the word, applied to animal life, is often used of that which is involuntary and merely mechanical; especially indicating the Cartesian doctrine, that animals (other than man) are like automata, mere machines, without either the vegetative or sensitive soul allotted to them by Aristotle. See PHYSIOLOGY, NERVOUS SYSTEM, LIFE.

Autom'aton is derived from two Greek words signifying self-movement, and is usually applied to machinery constructed to represent human or animal actions; 'automatic' used of an apparatus, implies that it does its work with little or no guidance or interference from man, as in a telegraphic 'automatic transmitter.' The construction of automata has occupied the attention of mankind from very early ages. Archytas of Tarentum is reported, so long ago as 400 B.C., to have made a pigeon that could fly. Hero of Alexandria describes in his book upon pneumatics a number of automatic contrivances which depend upon well-known principles. Other ancient writers record similar devices; but it is difficult to understand how these could have been made at a time when technical knowledge was at a low ebb. Many of them doubtless were simple tricks to impose upon the superstitious and credulous. One of the most perfect automata was one constructed by M. Vaucanson, and exhibited in Paris in 1738. It represented a flute-player, which placed its lips against the instrument, and produced the notes with its fingers in precisely the same manner as a human being does. In 1741 M. Vaucanson made a flageolet-player, which with one hand beat a tambourine; and in the same year he produced a duck. This was a most ingenious contrivance, the mechanical duck being made to conduct itself in every respect like its animated pattern. It swam, dived, ate, drank, dressed its wings, &c. as naturally as its live companions; and, most wonderful of all, by means of a solution in the stomach, it was actually made to digest its food! Brewster says of this duck 'that it was perhaps the most wonderful piece of mechanism that was ever made.' This statement is qualified by Robert Houdin, the celebrated conjuror, into whose hands Vaucanson's 'duck' was placed for repair. He found that the so-called 'digestive process' was brought about by a vulgar trick altogether unworthy of its author, who was without doubt a clever mechanician. M. Droz, a Swiss, made for the king of Spain a sheep that bleated, and a dog which guarded a basket of fruit. If any of the fruit was taken away, the dog barked incessantly until it was replaced. He also made a singing-bird, which was ultimately quite eclipsed by another made by Maillardet.

The 'Piping Bullfinch,' first exhibited at the London Exhibition of 1851, was a very perfect example of those automata which imitate the movement and song of birds. This piece of apparatus was a box of the size of a large snuff-box. Upon touching a spring, a tiny bird sprang from it, fluttered its wings, and trilled the true pipe of the bullfinch. The sound in reality came from the box, which contained a small pipe which could be shortened and lengthened by the action of a piston, so as to give different notes. It was controlled by a lever, which was actuated by studs on a small clockwork barrel, the necessary wind being furnished by bellows. It was indeed a very elaborate adaptation of the same principle which actuates the mechanical cuckoo in the well-known Swiss clocks. And in this connection, famous complicated clocks like that in the cathedral of Strasburg deserve mention.

Most of the automata which draw or write have probably been adaptations of the pantagraph principle. Houdin's writing and drawing automaton, which made a great sensation in Paris, was set in motion by clockwork.

All previous efforts in the making of automata were surpassed by Mr J. N. Maskelyne. The first one, 'Psycho,' was introduced to public notice in January 1875. This was a seated figure of light construction. During performance it was doubly insulated by being placed on a glass cylinder, which stood upon a small movable platform, furnished with porcelain castors. This arrangement at once negatives the idea that it might be worked by electricity. The figure moved its head, and from a rack in front of it chose the cards necessary for playing a hand at whist, which it played in a masterly manner. It also worked out calculations up to 100,000,000, showing the entire total of each calculation in a box in front by opening a sliding door. It acted without any mechanical connection with anything outside it, and yet was so much under control that it executed all orders intelligently. The nature of this control was so secret that, although Mr Maskelyne's assistants were aware that certain operations produced certain results, they were quite ignorant as to the principle upon which the automaton worked. Zoe (1877) was another automaton which owed its creation to Mr Maskelyne's ingenuity. This was also a sitting figure—insulated, and having no mechanical connection with anything else. During performance there was placed in front of it a sheet of drawing-paper, upon which it traced the likeness of any public character that might be chosen by the spectators from a list of 200 names. Mr Maskelyne also constructed other automata, which played upon musical instruments and performed other surprising feats.

'Automatic machines,' by which, on his 'dropping a penny in the slot,' the passer-by is provided with sweetmeats or other articles, have been of commercial importance since 1890; they are worked by mechanism liberated by the coin. In many Continental towns restaurants have been established in which one can obtain a complete meal from a range of automatic machines, some of which deliver various kinds of sandwiches and the like, while others give forth measured quantities of beer, coffee, and other beverages. Another variety is the penny-in-the-slot gas-meter, in which the insertion of a penny ensures a supply of so many feet of gas. In a wider sense a vast number of machines can be called automatic, inasmuch as, once set agoing, they perform a complicated series of operations without interference.

See Brewster's *Letters on Natural Magic;* Houdin's *Memoirs* and his *Secrets of Conjuring;* Hutton's *Mathematical Recreations.*

Automobile. See MOTOR-CARS, TRACTION-ENGINES.

Autonomy is a polity in which the citizens of any state manage their own government; parishes, corporations, religious sects may also enjoy a limited or local autonomy. Autonomy is often used to designate the characteristic of the political condition of ancient Greece, where every city or town community claimed the right of independent sovereign action. Recently the word is more specifically used of territories or provinces, which, while subject in some matters to a higher sovereignty, are autonomous in other respects. Thus the Treaty of Berlin made Eastern Rumelia an 'autonomous province;' though subject to the direct political and military authority of the sultan, it had, till its union with Bulgaria in 1885, 'administrative autonomy' in all its internal affairs.

Autoplasty (Gr., lit. 'self-formed'), a mode of surgical treatment which consists in replacing a diseased part by means of healthy tissue from another part of the same body. The most familiar instance is the Rhinoplastic or Taliacotian operation for supplying a new nose from the skin of the forehead.

Autopsy (Gr., 'seeing for one's self'), eye-witnessing, a direct observation; but generally used of a Post-mortem (q.v.) examination or dissection of the dead body.

Autosuggestion, a process to which much importance is attached by many psychologists and psychotherapists. The subject himself, formulating an action in his imagination (as by saying to himself words relating to the action), initiates in his unconscious mind a process which issues in action. Even automatic bodily functions can be influenced. Christian Science (q.v.) may be regarded as an application. The method is useful in education also.

Autotomy is the spontaneous detachment of a part of the body when injured or subjected to some other stimulus. It occurs in many animals, notably crustaceans and lizards, and may or may not be followed by Regeneration (q.v.).

Autotype. In this process, a sheet of paper coated with a film of bichromatised gelatine, in which lampblack or other permanent pigment has been held in solution or suspension, is exposed to the action of light, in a printing-frame, beneath an ordinary photograph negative. In proportion as the light is admitted to the gelatine film or 'tissue,' through the negative, it becomes hardened and insoluble in water. The print is afterwards treated by washing away the unaltered portions of the film, and the result is a permanent print of the object photographed. The process is admirably adapted for the reproduction of oil-paintings; and the enormous series of autotypes from the chief works in all the great public galleries of Europe, published by the Messrs Braun of Dornach, near Mülhausen, were epoch-making publications. The process has also been successfully employed for the reproduction of drawings; but where the work to be copied has a perfectly dead surface—as is the case, for instance, with charcoal sketches—the slight gloss possessed by the autotype print is a disadvantage. This objection is still greater in the reproduction of engravings and etchings; and for these the heliogravure process of M. Amand Durand of Paris is preferable, as here a metal plate is prepared by the aid of photography—more or less supplemented by retouchings by the hand with burin or etching-needle—and can be printed in ink and upon paper exactly similar to those of the original engraving or etching which is being copied. Autotypes, and

also heliogravures, can be printed with a margin, without mounting; a great advantage when book illustrations are required, as mounted photographs never preserve a perfectly flat surface, but, with the slightest change of temperature, warp the paper to which they are attached in a most unsightly manner. See PHOTOGRAPHY.

Autumn, the third season of the year, between summer and winter. Astronomically, in the northern hemisphere, it begins at the autumnal equinox, when the sun enters Libra, 22d September, and ends at the winter solstice, when the sun enters Capricorn, 21st December; but popularly, in Great Britain, it comprises the three months, August, September, and October. According to Littré, it extends in France from the end of August to the first fortnight of November; according to Webster, in North America it includes the months of September, October, and November. In the southern hemisphere it corresponds in time to the northern spring.

Autun, a town in the French department of Saône-et-Loire, in the Burgundian district of Autunois, situated on the river Arroux, 31 miles NW. of Chalon by rail. It is the seat of a bishop, and has a fine cathedral (12th century, restored 1865), college, museum, and library, and many ruins of Roman temples, gates, triumphal arches, and other antiquities. Cloth, carpets, and velvet are manufactured, and there is an active trade in horses, corn, and wood. Autun was the ancient *Augustodunum*, and has been by many identified with the earlier *Bibracte*, the chief city of the Ædui, though it seems more likely that the site of the latter was Beauvray, 10 miles distant. Under the Romans it became a famous school of eloquence. It was destroyed by Tetricus in 270 A.D., but was rebuilt by Constantine the Great. It was burned and pillaged by the Vandals in 406, Burgundians in 414, Huns in 451, Franks in 539, and Saracens in 739, and nearly destroyed by the Normans in 895. In 1379 it was burned by the English. At the Council of Autun (1094), King Philip I. was excommunicated for divorcing his queen, Bertha. The famous Talleyrand was bishop of the diocese, and here Macmahon was born. Pop. 15,000.

Auvergne, a southern central district of France, was before the Revolution a separate province, and coincided nearly with the modern departments of Cantal and Puy-de-Dôme. Auvergne falls naturally into two divisions—Upper Auvergne, to the south, rugged and mountainous; and Lower Auvergne, to the north, some parts of which, especially on the left bank of the Allier, are distinguished for extraordinary fertility. The climate is subject to violent extremes and great storms, cold in the mountainous districts, whilst in the plains the heat of summer is often oppressive. Not only do the cone and dome-like shapes of the summits betray a volcanic formation, but also the great masses of basalt and trachyte that break through the crust of granite and gneiss, render it manifest that this was a great focus of volcanic action at a comparatively recent period. Among the summits that have apparently been at one time volcanoes, the most remarkable are Cantal (6093), Mont-Dore (6188), and Puy-de-Dôme (4806): all are now covered with verdure. The lava-covered plateaus are desert, but the pulverised volcanic earths that cover the slopes and valleys form a rich and fruitful soil. Agriculture is in a rude and backward condition; but the breeding of cattle, especially of mules, is diligently carried on. Auvergne produces iron, lead, copper, and coal, and is rich in valuable mineral springs, both cold and hot.

The Auvergnats are a highland people, rude and ungainly, poor, ignorant, and, though of southern temperament, laborious. They are probably the almost unmixed descendants of the ancient inhabitants of this part of Gaul, and speak a dialect of their own. Large numbers of them go to service in Paris and other northern towns, where they are marked by their pronunciation. Auvergne has, however, produced distinguished men, such as the Arnauld family, Pascal, Lafayette, and Polignac. The chief towns are Clermont and Aurillac (q.v.). The country derived its name from the Celtic *Averni* or *Arverni*, who long defended their fastnesses against Cæsar, as later against the Goths, Burgundians, and Franks. Long a separate county, it was not incorporated with France till 1531.

Auxerre (anc. *Autissiodorum*), the chief town of the French department of Yonne, stands on the river Yonne, 109 miles SE. of Paris by rail, in a rich district abounding in vineyards. It is poorly built, but presents an imposing aspect from a distance, the most prominent feature being the noble Gothic cathedral, which dates from 1215, but was not completed till the 16th century. There are two other interesting churches, a museum, a large library, statues of Fourier and Davout, &c. Auxerre was a flourishing town before the Roman invasion of Gaul. It was destroyed by the Huns in 451, and in 486 was wrested by Clovis from the Romans. The county of Auxerrois came finally in 1477 to the kingdom of France. The principal manufactures are wine (a light Burgundy), candles, chemicals and hosiery. Pop. 21,000.

Auxiliaries. See MILITIA, VOLUNTEERS, YEOMANRY, MERCENARIES.

Auxonne, a fortified town in the French department of Côte d'Or, on the left bank of the Saône, 20 miles SE. of Dijon. Pop. 4000.

Ava, a ruined city of Burma, of which it was the capital from 1364 to 1740, and again from 1822 to 1837. It stands on the left bank of the Irawadi, about 6 miles to the SW. of Amarapura. Ava now is almost a desert, its temples and houses having been reduced to ruins by an earthquake in 1839. On the opposite bank stands Sagaing, which has twice been the seat of government.

Ava, Arva, Yava, or KAVA (*Piper methysticum*), a plant of the family Piperaceæ (q.v.), possessing narcotic properties. It is a member of the same genus as the peppers. It is a shrubby plant, with heart-shaped, acuminate leaves, and very short, solitary, axillary spikes of flowers. It is a native of many of the South-sea islands, where the inhabitants intoxicate themselves with a fermented liquor prepared from the upper portion of the root and the base of the stem. The rhizome is thick, woody, rugged, and aromatic. The intoxicating liquor is prepared by macerating it in water. The savage Tahitians were accustomed to prepare it in a very odious manner; much as the Indians of the Andes prepare *Chicha* or Maize beer—chewing the root, depositing it in a bowl, straining through cocoanut husk, and mixing with water or coconut milk. As the beverage was drunk immediately afterwards, no fermentation could have taken place, and the narcotic property is therefore ascribed to an acrid resin, *Kawine*, which is present in the root. For an account of the manufacture of the beverage, see Mariner's *History of the Tonga Islands*. The taste is unpleasant to those unaccustomed to it, and has been likened to that of rhubarb and magnesia. The intoxication is not like that produced by ardent spirits, but rather a stupefaction like that caused by opium. It is succeeded by a copious perspiration. The habitual use of ava causes a whitish scurf

on the skin, which, among the heathen Tahitians, was reckoned a badge of nobility, the common people not being able to indulge freely enough. Ava is, like cocain, a local anæsthetic.

Avadavat. See WEAVER-BIRDS.

Avalanches (Fr., from *avaler*, 'to descend') are masses of snow or ice that slide or roll down the declivities of high mountains, and often occasion great devastation. They have various names, according to their nature. Drift or powder avalanches (Ger. *Staub-lawinen*) consist of snow, which, loose and dry from strong frost, once set in motion by the wind, accumulates in its descent, and comes suddenly into the valley in an overwhelming dust-cloud. Avalanches of this kind occur chiefly in winter, and are dangerous on account of their suddenness, suffocating men and animals, and overturning houses by the compression of the air which they cause. Another kind of avalanche resembles a landslip. When the snow begins to melt in spring, the soil beneath becomes loose and slippery; and the snow slides down the declivity by its own weight, carrying with it soil, trees, and rocks. The greatest danger is where elevated tracts of moderate declivity are separated from the valleys by precipitous walls of rock; the softened snow of spring beginning to roll or slide on these slopes, is hurled over the precipices with fearful force into the valleys. The very wind caused by them prostrates forests and houses. Ice avalanches are those that are seen and heard in summer thundering down the steeps—e.g. of the Jungfrau. They consist of masses of ice that detach themselves from the glaciers in the upper regions. They are most common in July, August, and September. Nine great Alpine avalanches, which cost 447 lives, are on record between 1518 and 1879, the most destructive being one of 1827, which swept away half the village of Biel, in the Upper Valais, with 88 inhabitants. Sudden avalanches, larger or smaller, constitute one of the special dangers of Alpine climbing. See Coaz, *Die Lawinen der Schweizeralpen* (Bern, 1881); Heim, *Handbuch der Gletscherkunde* (1885).

Avallon (anc. *Aballo*), a town of the department of Yonne, France, 26 miles SE. of Auxerre, on a steep hill of red granite, nearly surrounded by the river Cousin. A very ancient town, it was often besieged and taken; its church dates from the 12th century. Pop. 5000.

Avalon, or AVILION (perhaps Welsh *Ynys ar Afallon*, 'island of apples'), the name of the earthly paradise of Celtic mythology, a green island far to the westward where the sun-god seems to sink to his rest. Thither came heroes like Arthur, and there they continued to live. Here were the mystic fountain, the apples (*avlan*) with their strange magical properties, and the mighty smith who forged 'Duré Entaille' for Arthur. The name was applied in the chivalrous poetry of the middle ages to the region where the fairy Morgana holds her court, and afterwards by rationalising historians to the 'Isle of Saints'—the peninsula (once an island) in the river Brue in Somersetshire on which stood the abbey of Glastonbury (q.v.), with its legends of Joseph of Arimathea and of King Arthur (sent to be healed of his wounds).

Avalon, a peninsula forming the eastern part of Newfoundland (q.v.), in which St John's, the capital, is situated.

Avanturine. See AVENTURINE.

Avars, a tribe of Tatar origin, who made their appearance a hundred years later than the Bulgarians, in the countries about the Don, the Caspian Sea, and the Volga. One part of them remained in the Caucasus, another part pressed forward (about 555 A.D.) to the Danube, and settled in Dacia. Here they served in Justinian's army, and assisted the Lombards to overturn the kingdom of the Gepidæ; and, about the end of the 6th century, under the mighty Khan Bajan, they conquered Pannonia. Later, they mastered Dalmatia; made devastating incursions into Germany and Italy; and extended their dominion over the Slavs living on, and northwards from, the Danube, as well as over the Bulgarians as far as the Black Sea. These nations at last rose against them, and in 640 A.D. drove them out of Dalmatia. Confined to Pannonia, they were subdued by Charlemagne, and well-nigh extirpated by the Moravians, so that after 827 they disappear from history. They usually surrounded their settlements with fortifications of stakes driven into the ground, and earth, of which traces, under the name of Avarian Rings, are yet found in the countries formerly occupied by them. The results of recent criticism show that, in all probability, the Avars belonged to the same great Turanian stock as the Huns, and that their original residence was the land lying east of the Tobol, in Siberia.

Avatar' (Sanskrit, *avatâra*) signifies primarily a descent, but is specially applied to the descent of a Hindu deity upon the earth in a manifest shape, either for beneficent or for retributive ends. It is thus almost synonymous in its signification with the Christian term 'incarnation.' The word is sometimes rhetorically employed in English literature as equivalent to manifestation or phase. The ten avatars of Vishnu (q.v.) are the most famous in Hindu mythology.

Avatcha, a bay on the east coast of Kamchatka, by far the best harbour of the whole peninsula, and containing within it the smaller bay on which stands the capital city of Petropavlovsk (q.v.). Avatcha Bay is one of the finest harbours in the world, and is surrounded by superb scenery. The name is also given to two volcanoes lying to the north—one (Govälaja Sopka) 8500 feet high; the other (Koryätskaya Sopka) 10,000 feet high.

Avebury, or ABURY, a small village of Wiltshire, 6½ miles W. of Marlborough. It is remarkable as the site of the largest megalithic structure in Britain, and as having in its neighbourhood several barrows and cromlechs of remote antiquity. A large outer circle, occupying a flat area of ground on the south of the Kennet, a diminutive tributary of the Thames, consists, or rather consisted, of a hundred large blocks of stone, placed on end in a circular form, around a level area 330 yards in diameter, bounded by a deep ditch and a high embankment. There are also remains of two smaller stone circles within the inclosure, one consisting of two concentric circles of 43 upright stones, with a menhir, or obelisk, 20 feet high, near the centre; the other, a similar double circle of 45 stones, to the north-west of the former, with a dolmen in the centre. The stones that remain of this ancient work are not of uniform size; they measure from 5 to 20 feet in height above the ground, and from 3 to 12 in breadth and thickness. The embankment, which is broken down in several places, had originally an entrance to the circle, from which issued the 'Kennet Avenue,' running 1430 yards south-eastward in a perfectly straight line, and 17 yards broad, with a range of blocks on either side similar to those of the circle itself. Of the surrounding antiquities, those which appear most closely connected with the circle are the double circle (155 × 138 feet) on Hakpen Hill, and a large barrow, or lofty conical mound called Silbury Hill, three-quarters of a mile to the south. It is situated nearly midway between the two

avenues, in the line of the ancient Roman road between London and Bath. Close to the base, it measures 676 yards in circumference; the sloping height is 249 feet; the perpendicular height, 130 feet; the diameter of the level area at the top, 104 feet; the space covered by the whole work, over 5 acres. Avebury was included in the Ancient Monuments Protection Act, 1882.

Very little was known of Avebury temple and the antiquities in its vicinity till the year 1740, when Dr Stukeley published his *Stonehenge and Abury, Two Temples restored to the British Druids;* though Aubrey had written an account of them in 1663, by command of Charles II., the manuscript of which still exists. None of the earlier topographers or antiquaries appear to have left any description of them. When Sir Richard Hoare, in collecting materials for his *Ancient Wiltshire*, examined them in 1812, 72 years after Stukeley, and 164 after the first survey by Aubrey, a great number of the stones had disappeared, and in many places it was difficult to trace out even the plan of the works. Mr Fergusson believed the Avebury circle and Silbury Hill to mark the graves of those who fell in the twelfth or last Arthurian battle, at Badon Hill (520 A.D.), whilst Lord Avebury assigned Avebury to the close of the Stone, or the commencement of the Bronze, Age. Mr St George Gray's excavations point to Neolithic times. See works cited under STONEHENGE.

Avebury, LORD. See LUBBOCK.

Aveiro, a town of Portugal, in the province of Beira, 40 miles S. of Oporto by rail. It is situated on the Ria d'Aveiro, a salt lake or lagoon, joined to the sea by a canal; is a bishop's see; and has fisheries. Pop. 10,000.

Avelli'no (anc. *Abellinum*), chief town of an Italian province of the same name, at the foot of Monte Vergine, 59 miles E. of Naples by rail. The monastery has a miracle-working image of the Virgin. Avellino suffered greatly from earthquakes in 1694, 1731, and 1805. It has a cathedral and college, manufactures of linen, paper, and hats, and a trade in corn and in hazel-nuts. Pop. (1921) 25,595; of province, 403,385 (1158 sq. m.).

A've Mari'a, also ANGELICA SALUTATIO or the Angelic Salutation, are names given by the Roman Catholics to a very common form of address to the Virgin Mary. *Ave Maria* are the first two words of the prayer, in Latin, which is taken from the angel Gabriel's salutation (Luke i. 28): 'Hail, Mary, highly favoured, the Lord is with thee; blessed art thou among women.' In this form, according to an ordinance of Gregory I., with the addition of Elizabeth's words, 'and blessed is the fruit of thy womb,' the invocation was at first said by the priests during mass, on the fourth Sunday after Advent. With the extended cult of the Virgin since the 11th century, the Ave Maria appears as a lay-prayer of equal use with the Pater Noster, and was sanctioned as such at the end of the 12th century. Accordingly, not only did Urban IV. (1261) add the concluding words, *Jesus Christus, Amen*, but since the first half of the 16th century, the prayer began to receive, more and more commonly, as an addition to the old formula, what constitutes the conclusion of the modern form: 'Holy Mary, mother of God, pray for us sinners, now and at the hour of our death, Amen.' The complete form in Latin is: 'Ave Maria, gratia plena, Dominus tecum, benedicta tu in mulieribus; et benedictus fructus ventris tui, Jesus. Sancta Maria, Mater Dei, ora pro nobis peccatoribus nunc et in hora mortis nostræ, Amen.' An edict of John XXII. (1326) ordains that every Catholic shall, morning, noon, and evening, at the warning of the bells, repeat three aves. This ringing of bells as a summons to morning, mid-day, and evening prayer, is retained in some countries, and is still called the Ave Maria, or Angelus Domini. The whole prayer as it now stands is ordered in the breviary of Pius V. (1568) to be said daily before the Canonical Hours (q.v.), as well as after Compline. The aves are reckoned by the small beads of the rosary, which are hence called Ave Marias, while the large beads are devoted to the Pater Noster. The name *Angelus Domini* comes from the Latin version of the passage in Scripture introducing the salutation. There are famous musical settings of the Ave Maria by many of the great composers.

Avempace (*Ibn Badja*), Arabian philosopher, was born in Spain towards the close of the 11th century, most likely at Saragossa, lived as a physician in Morocco at the court of the Almoravides, and died at Fez in 1138. His principal work, known to us only through a Jewish writer of the 14th century, was the *Conduct of the Solitary*, a system of rules whereby mankind might rise to higher things.

Avens, the popular name of Geum (q.v.), a genus of Rosaceæ, of which two species, *G. urbanum*, the Common Avens, and *G. rivale*, or Water Avens, with their hybrids, are common in Britain, and range through temperate regions. The roots were formerly used in pharmacy as a tonic, astringent, and aromatic, whence the names of clove-root and herb-bennet (*herba benedicta*) of old herbals.

Aventine Hill. See ROME, p. 761.

Aventi'nus [JOHANNES THURMAYR], a scholar and historian, born at Abensberg (Lat. *Aventinum*), Bavaria, in 1477, studied at Ingolstadt, Vienna, and Paris, and afterwards taught Greek and mathematics at Cracow. In 1509 the Duke of Bavaria called him to Munich, and intrusted him with the education of his sons. Here Aventinus wrote his history of Bavaria (*Annales Boiorum*). This work was not published until twenty years after his death, which took place at Ratisbon in 1534, and then only with large portions, more true than pleasant, about the Romish Church, excised. These, however, were all restored in Cisner's edition of 1580. Aventinus wrote several other learned works on history and antiquities. A complete edition of his works was issued by the Bavarian Academy of Sciences (Munich, 5 vols. 1880–84). His monument was erected in his native town in 1861. See Döllinger's *Studies in European History* (Eng. trans. 1890).

Aven'turine, or AVANTURINE, a vitreous variety of quartz, generally translucent, and of a gray, green, yellow, red, or brown colour, and containing numerous minute spangles. These last are generally mica, but sometimes, according to some authorities, they are scales of metallic copper. It is used in jewelry, but is not so much valued as the finer kinds of amethyst or cairngorm stone. It is found in Silesia, Bohemia, France, Spain, and India, but chiefly in the Ural Mountains, near Ekaterinburg. Beautiful imitations of aventurine are made. The name for the natural substance in fact is borrowed from that applied to the artificial gold-spangled glass which originated accidentally —*all' avventura* (*par aventure*)—at Murano, near Venice.

Avenzoar (properly *Ibn Zohr*), ABU MERWAN, an Arabian physician, born in Spain about 1072, died in 1162. He was the teacher of Averrhoes (q.v.), who speaks highly of his wisdom. One of his works was translated into Hebrew in 1280, and from thence into Latin, and was published, under the title *Rectificatio Medicationis et Regiminis*, at Venice, in 1490. It has since passed through numerous editions (as at Lyons, 1851).

Average. If any number of unequal quantities are given, another quantity may be found of a mean or intermediate magnitude, some of the given quantities being greater, and others less, than the one found, which is called the average. The exact relation is this: that the sum of the excesses of the greater above the average is equal to the sum of the defects of the less below it. If there are seven vessels unequally filled with sand, and containing, say, 5, 10, 12, 8, 11, 14, 3 ounces, the average is found by adding the numbers together, and dividing the sum 63 by 7, which gives 9 ounces as the average. Reflection, however, requires to be exercised in striking averages. If a farmer has three lots of cattle, the first of which he averages at £25 a head, the second at £15, and the third at £9, it might be thought that the average of the whole stock made up of the three lots would be got by taking the mean of £25, £15, and £9—viz. $25 + 15 + 9 \div 3 = £16\frac{1}{3}$. But this would be correct only if there were an equal number of cattle in each of the lots. To get the real average in case of the lots being unequal, he must multiply the average of each lot by the number of cattle in it, add the three products together, and divide by the whole number of cattle in all three lots taken together. If we suppose 9 head in the first lot, 20 in the second, and 15 in the third, the average is $(25 \times 9) + (15 \times 20) + (9 \times 15) = 660 \div (9 + 20 + 15) = £15$.

General Average is a contribution made by the various interests associated in a maritime adventure to restore the value of any sacrifice or extraordinary expense voluntarily incurred for the general safety. This equitable rule is to be found in the Rhodian law (see RHODES) and in the Rolls of Oléron (q.v.), and has been adopted with certain modifications by all maritime nations. The requisites to this contribution are that the sacrifice of part of the cargo, ship, or rigging has been advisedly made to procure the safety of what remains. The loss must not be caused by fault of the master or improper stowage; thus the throwing overboard or jettison (see FLOTSAM) of deck cargo will not give rise to average unless the stowing on deck is customary or agreed to by the contributing parties. The value of the cargo thrown overboard is computed at the market price at the port of delivery, less freight and charges saved. Among other losses covered by general average are those arising from the discharge of cargo to lighten the ship, from damage to ship or cargo in order to extinguish fire, or from cutting away masts or slipping anchors and cables to save the ship. The expenses incurred in floating a stranded ship or entering a port of refuge are also included, but no loss or expense falling under the shipowner's contract to keep his ship fit for service will be so included.

The contributing parties are the owners of the ship, the cargo, and the freight, or in modern times the insurers of these, and they are assessed in proportion to their value. The owners of the cargo pay on the net market value at the port of destination, or where the voyage is broken up, and the goods jettisoned contribute as well as those saved, as otherwise the owner of the lost goods would be placed in a better position than the others. Seamen's wages, and the personal effects of crew and passengers, are exempt from contribution.

If the ship reaches her destination, the average must be adjusted at that port, and in accordance with the law of the place; but if the voyage is broken up, the port of loading is taken. The adjustment of averages is often a very complicated task, and is usually undertaken by persons specially engaged in that business, called average adjusters.

Much inconvenience has arisen from the want of a uniform system of general average in different countries, and an effort to establish such a system was made by an international congress which met in Glasgow in 1860. At a subsequent meeting at York in 1864 a code of rules was drawn up, but no practical result followed. At Antwerp in 1877 the York rules were revised; and the York-Antwerp rules, again revised at Liverpool in 1890, became generally recognised by means of a clause inserted in bills of lading and insurance policies. The International Law Association expended much labour upon the problem of average, and drew up an elaborate draft code in 1914.

Particular Average is the partial loss of ship or cargo, or damage thereto from accidental causes. In this case the common safety is not in question, and there is consequently no contribution, the loss remaining where it falls. To such cases the term average does not seem properly to apply, but the name has become applicable to all claims for loss at sea when not total, and its use in this case may possibly be explained by the consideration that such losses under marine policies are usually made good by *contribution* from various underwriters or joint-insurers.

An *Average Bond* is sometimes entered into by the contributories in order to fix an arbiter to adjust the average.

See Hopkins's *Handbook of Average*, Duckworth's *General and Particular Average* (1905), Arnold's *Marine Insurance* (8th ed. 1909); also INSURANCE.

The etymology of the word has caused much discussion. It first appears about the year 1500 in connection with the maritime trade in the Mediterranean; hence the corresponding Fr. *avarie*, Span. *avería*, Port. and It. *avaria*, as well as in the borrowed Ger. *hafarei*, and Dutch *avarij*. The Italian form is most probably the original, from *avere*, 'goods;' Lat. *habēre*, 'to have.' The It. *avere* is thus our old Eng. *aver*, 'property,' often specially in cattle, therefore 'cattle,' 'horses.' The reader of Burns will remember the word *aiver*, 'an old horse.'

Aver'nus (Gr. *Aornos*, 'birdless'), called now Lago d'Averno, is a small, nearly circular lake in Campania, Italy, situated between Cumæ, Puteoli, and Baiæ. It is about a mile and a half in circumference, and occupies the crater of an extinct volcano. It is in some places as deep as 200 feet, and is almost completely shut in by steep and wooded heights. The sulphureous and mephitic vapours arising from the lake were believed in ancient times to kill the birds that flew over it; hence, according to some, its Greek appellation. Owing to its gloomy and awful aspect, it became the centre of almost all the fables of the ancients respecting the world of shades. Here was located Homer's entrance to the under world; here the Cimmerians are said to have dwelt in deep caverns, without ever coming into the light of day; here also were placed the Elysian fields, the grove of Hecate, and the grotto of the Cumean Sibyl. Agrippa caused the dense woods to be thinned, by which the place lost much of its wildness; and by a cutting connected it with the Lucrine Lake and the sea, so as to make it a kind of harbour, but the volcanic upheaval of the Monte Nuovo in 1538 altered the region, and made Avernus again an inland lake. On its east side are ruins of a temple of Apollo, on its south side what is shown as the famous grotto of the Sibyl.

Averrho'a. See CARAMBOLA.

Averrho'es, or AVERROES (properly *Ibn Roshd*), the most famous of the Arabian philosophers, was born at Córdoba, in Spain, in 1126. His father, who was judge there, instructed him in Mohammedan jurisprudence. In theology and philosophy, he had Ibn Tophail for his teacher;

and in medicine, Ibn Zohr, the elder. His talents and acquirements made him be appointed successor to his father, and afterwards judge in Morocco. For a while he was the khalif's physician. Being accused of a departure from the orthodox doctrines of Mohammedanism, he was dismissed from his office, and condemned to recant his heretical opinions, and do penance. After this, he returned to his native place, and lived in great poverty, until the khalif reinstated him in his offices, on which he went back to Morocco, where he died in 1198. Averrhoes regarded Aristotle as the greatest of all philosophers, and though he was ignorant both of Greek and of Syriac, illustrated his writings with great penetration; but the influence of the Alexandrian or Neoplatonic views is seen in his works, as in those of most of the Arabian philosophers. Thus he teaches the doctrine of a Universal Reason (other than the individual reasons), indivisible, but shared in by all; and denied the immortality of individual men. He expounded the Koran according to Aristotle, and so founded a Moslem philosophy of religion, the cause of many heresies. In opposition to the Arabian orthodox school, especially against Algazali, Averrhoes stood forth on the side of reason as the defender of philosophy. The Arabians called him, by way of eminence, the Expositor (of Aristotle). Most of his writings are known to us only through Latin translations (Ven. 1489). The Arabic text of the philosophical works was published in 1859 by M. J. Müller, followed by a German translation in 1875. Averrhoes also wrote a sort of medical system, which, under the name of *Colliget*, was translated into Latin, and repeatedly printed. The philosophy of Averrhoes attained to importance in the Christian Church as early as the 13th century, although his pantheistic doctrine of the unity of the active principle in the universe was often repudiated as an error, and astrology was characterised as Averrhoism. See Renan's *Averroès et l'Averroïsme* (3d ed. 1882).

Aversa, a town of Southern Italy, in the province of Caserta, 12½ miles by rail N. of Naples, in a beautiful district rich in oranges and wine. It is well built, and has a cathedral and a number of monasteries, in one of which Andrew of Hungary, the Darnley of Neapolitan history, was murdered with the connivance of his wife, the beautiful but guilty Joanna, queen of Naples; it has also an excellent asylum for the insane, established by Murat, and a foundling hospital. Aversa was built in 1029 by the Normans. About two miles from Aversa are a few ruins of Atella, famous as the birthplace of the satirical farces so popular on the Roman stage (see ATELLANÆ). Pop. 25,000.

Aves. See BIRD.

Avesnes, a fortified town in the French department of Nord, 13 miles E. by rail of Cambrai, and 8 miles from the Belgian frontier, with a pop. of 5000, who make cloth, soap, and beer.

Avesta. See ZEND-AVESTA.

Aveyron, a department in the south of France, named from the river which runs westwards through it, and after a course of 90 miles falls into the Tarn, a feeder of the Garonne. The department of Aveyron has an area of 3376 sq. m., in one of the most mountainous parts of France. Situated between the highlands of Auvergne and the Cevennes, it slopes like a terrace south-west to the Garonne. A third part of the land is unfit for cultivation, but affords excellent pasture for the numerous herds of cattle, goats, sheep, and swine, which form the principal resources of the mountaineers. The famous Roquefort cheese is exported hence in large quantities. Coal, iron, lead, zinc, copper, silver, alum, and antimony are found and wrought; and paper, cotton and woollen cloths, and leather are produced. The capital is Rodez. There are many prehistoric remains in the department, which formed part of Guienne. Pop. 333,000

Avezza'no, a town of South Italy, in the province of Aquila, 22 miles S. from Aquila, with old walls and other antiquities. Of 11,000 inhabitants, few survived the earthquake of 13th January 1915.

Avia'nus, FLAVIUS, a Latin author who lived probably in the 3d or 4th century of our era, and of whose writings forty-two Æsopic fables in poor elegiac verse are extant. They were translated and published by Caxton. There are editions by Lachmann (1845) and Robinson Ellis (1887). See FABLE, BEAST-FABLES; also Hervieux, *Avianus et ses Anciens Imitateurs* (1893).

Aviary, a place for keeping birds; of which the arrangements must depend upon the habits of its inmates, the climate suited to them, and other circumstances. A large room may be fitted up as an aviary, with complete arrangements for heating and ventilation, and with perches resembling trees and branches, patches of sand or gravel, secluded places for nesting, and a trough of clear water; or in the open air a large space may be included within network, with actual trees and grass, and running water. In such spacious aviaries birds may be expected to thrive and breed better than in a bird-cage, which is a small aviary.

Aviation. See BALLOONS AND AEROPLANES.

Avicebron, long deemed, like Avempace, an Arabian philosopher, till Munk identified him in 1857 with Salomo ben Jehuda ibn Gabirol, a Jewish poet and philosopher. Born about 1020 at Cordova or Malaga, the latter in 1045 was expelled from Saragossa, and, after an unhappy, wandering life, died about 1070 at Valencia. His great work, *Mekor Chajim*, was written in Arabic; but through a Latin translation, *Fons Vitæ*, became known to the 13th-century Schoolmen. Its speculations are largely based on those of the Neoplatonists, especially Plotinus. See monographs by Geiger (1867), Stössel (1881), and Wittmann (1900-5); and the introductory essay to Wise's text and translation of *The Improvement of the Moral Qualities* (1902).

Avicenna (Arabic *Ibn Sina*), a famous Arab philosopher and physician, was born 980, near Bokhara, his father being a Persian tax-collector. He studied with singular zeal and success the Koran, mathematics, astronomy, the philosophy of Aristotle, and medicine. He was physician to several of the Samanide and Dilemite sultans, and also for some time vizier in Hamadan, where, after some years of retirement at Ispahan, he died in 1037. His works are based on those of the Greeks, whom he knew only through Arabic translations. His medical system, the *Canon*, long remained the standard of teaching and practice. His philosophy was Aristotelianism modified by Neoplatonic elements. Of his numerous writings, the chief, both medical and philosophical, were translated into Latin as early as 1493, and often reprinted. See Carra de Vaux, *Avicenne* (Par. 1900).

Avicennia, or WHITE MANGROVE, a genus of Verbenaceæ (q.v.), consists of trees or large shrubs resembling mangroves (see MANGROVE), and like them, growing in tidal estuaries and salt-marshes. Their creeping roots, often standing six feet above the mud in crowded pyramidal masses, and the naked asparagus-like suckers which they throw up, have a singular appearance. The bark of *A. tomentosa*, the White Mangrove of Brazil, is used for tanning. *A. resinifera*, named in error, is now called *A. officinalis;* the gum used by Maoris for chewing was probably Kauri, and not anything derived from an Avicennia.

Avic'ula. See PEARL.

Avie'nus, RUFUS FESTUS, a Latin descriptive poet of some merit, who flourished about the end of the 4th century. His works are *Descriptio Orbis Terræ*, in 1394 hexameters; *Ora Maritima*, in 703 iambic trimeters, describing the Mediterranean shore from Marseilles to Cadiz; *Aratea Phænomena*, in 1325, and *Aratea Prognostica*, in 552 hexameters, a paraphrase of the two well-known works of Aratus. See Holder's edition (Innsbruck, 1887).

Avi-fauna (Lat. *avis*, 'bird,' and *fauna*), a collective term for the birds found in any country: the fauna or zoology of that region as regards the birds. See FAUNA, GEOGRAPHICAL DISTRIBUTION.

Aviglia'no, a town of South Italy, in the province of Potenza, situated on a hill-ridge, 10 miles NW. of Potenza. Its inhabitants rear cattle, and are noted for their peculiar costume. Pop. 20,000.

Avignon (*Avenio*), a city of Provence, capital of the French department of Vaucluse, is situated on the left bank of the Rhône, 75 miles NW. of Marseilles. With narrow, crooked streets, 'windy Avignon' still is encircled by lofty crenellated walls (1349–68), except on the north side, where the Rocher des Doms rises steeply from the Rhône to a height of 200 feet. Here is the cathedral of Notre Dame, dating from the 11th century, with its papal throne, and monuments of two popes; whilst hard by towers the vast palace of the popes (1339–64). The multitude of churches and convents made Rabelais call Avignon *la ville sonnante*, 'the city of bells;' and churches there still are in plenty, though that of the Cordeliers, with the tomb of Petrarch's Laura, was demolished in 1791. Near the hôtel-de-ville (1862) are the quaint old Jacquemart belfry and a statue of Crillon, Henry IV.'s brave captain; Petrarch's statue (1874) may also be noticed. The city is the seat of an archbishop, has a museum and picture-gallery, and several other valuable institutions. The university, founded in 1303, was abolished in 1794. Avignon has manufactures of paper, leather, silk, iron, &c., and is famous for its garden produce, its fruit, wine, honey, &c. The country about Avignon is delightful, and extremely fruitful in corn, wine, olives, oranges, and lemons. The population is about 48,000. In Avignon, Petrarch spent several years; here, in the church of St Clara, he first saw Laura. Vaucluse, which he has immortalised, lies 18 miles from Avignon. Avignon was the capital of the ancient *Cavares*, and presents many remains of the times of the Romans. In the middle ages, it formed, with the surrounding district, a county, which the popes, who had already received the county of Venaissin as a gift from King Philip III., bought in 1348 from Joanna, queen of Naples and Countess of Provence. The pope governed both counties through a vice-legate, and continued in the possession of them till 1790, when, after several stormy and bloody scenes, the city with its district was united with France. At the peace of Tolentino (1797), the pope formally resigned Avignon and Venaissin. Avignon is celebrated in ecclesiastical history as being for a time the residence of the popes. By order of Philip IV. of France, Pope Clement V. and six of his successors from 1309 to 1377, were obliged to reside there. It was afterwards (1378–1418) the residence of the French antipopes. Two ecclesiastical councils were also held at Avignon (1326–37). A little cottage here was long the loved retreat of John Stuart Mill, and there he died in 1873. See *The Story of Avignon*, by Thomas Okey (1911).

Ávila, a town of Spain, capital of the province of Ávila, in Old Castile, situated at a height of 3000 feet above the sea, at the base of the Sierra de Guadarrama, 71 miles NW. of Madrid by rail. Ávila has a fine Gothic cathedral and a Moorish castle, and its massive granite walls still stand, 42 feet high and 14 broad, with 86 towers and 10 gateways. Its university, founded in 1482, was reduced to a college in 1807. Population, 14,000, engaged in manufacturing cloth. Here St Teresa was born.—The *province* is mountainous, but has fertile valleys. Its mineral wealth is still undeveloped; the chief produce is merino wool. Area, 3000 sq. m.; pop. 206,000.

Ávila, GIL GONZÁLEZ DE, born at Ávila in 1577, was a royal historiographer for Castile, wrote histories of several Castilian kings, and died in 1658.

Ávila y Zúñiga, DON LUIS DE, a Spanish general, diplomatist, and historian, born about 1490, enjoyed the favour and confidence of Charles V., who intrusted him with embassies to the popes Paul IV. and Pius IV. He accompanied the emperor on his expedition against the German Protestant princes, and wrote an account of the war, *Comentarios* (1547).

Avilés, (anc. *Flavionavia*), a seaport of Spain, close to the Bay of Biscay, 19 miles N. of Oviedo. There are coal and copper mines in the vicinity. Manufactures of earthenware, glass, linen, &c. are also carried on. Pop. 14,600.

Avilion. See AVALON.

Avi'so (Span. *aviso*, 'advice,' 'intelligence'), a despatch-boat, a small swift vessel belonging to the navy; also used of a kind of torpedo-boat.

Avison, CHARLES, a musical composer, was born at Newcastle about 1710, and after studying in Italy, became organist at Newcastle, where he died in 1770. He wrote an *Essay on Musical Expression* (1752), in which he ranked the French and Italian composers above the Germans; and he composed sets of concertos and sonatas which were very popular for a time. He figures in Browning's *Parleyings with Certain People.*

Avizandum (late Lat. *avizare*, 'to consider,' 'to advise') formerly meant the report of a cause made by a Lord Ordinary to the Inner House of the Court of Session, when all causes were decided by the Inner House, and merely sent to the Ordinary for procedure. This practice survives only in the case of five different kinds of action. The word is also applied to the consideration which the Lord Ordinary now gives to a cause before pronouncing judgment. It is also used when a sheriff or other judge takes a case for private consideration outside the Court, and delays judgment.

Avlona (Ital. *Valona*, anc. *Aulon*), the best seaport in Albania, stands on an eminence near the Gulf of Avlona, an inlet of the Adriatic, at whose mouth is the island of Sasseno, the ancient Saso, with Italian garrison (till 1914 Greek). It carries on considerable trade with Brindisi, &c. Pop. about 6000. The Christian inhabitants, chiefly Italians, are engaged in commerce, exporting oil, wool, salt, pitch, and especially tortoise-shell. The Mohammedans manufacture weapons and woollen fabrics. *Valonia*, exported for tanning, is the pericarp of an acorn grown in the neighbourhood. Up to 1691 the town belonged to Venice, up to 1912–13 to Turkey. In the anarchy of the Great War it was occupied by Italy; evacuated 1920.

Avo'ca, or OVOCA (Celt. 'meeting of the waters'), a small river in the SE. of County Wicklow, formed by the union of the Avonmore and Avonbeg, which rise in the hills of the centre of the county. The Avoca runs through a very picturesque vale only a quarter of a mile broad, with wooded banks 300 to 500 feet high, and after

a course of 9 miles reaches the sea at Arklow. A railway now extends through the vale, and connects a mining district with Wicklow and Dublin. The 'sweet vale' is celebrated in one of Moore's *Irish Melodies*. At Avondale, on the Avonmore, Charles Stewart Parnell was born.

Avoca'do Pear, or ALLIGATOR PEAR (*Persea gratissima*), a fruit-tree of the natural order Lauraceæ (q.v.), is a native of tropical America and the West Indies. The fruit is a drupe, but in size and shape resembles a huge pear; is usually of a brown colour, and has a soft or deep green pulp, not very sweet, but of a delicate flavour, which dissolves like butter on the tongue, and contains a large quantity of a fixed oil which is sometimes expressed for soapmaking and illuminating purposes. It is called *vegetable butter* in some of the French colonies. It is much esteemed in the West Indies, and often eaten with pepper and salt, or with sugar and lime-juice or spices. The seeds give a black stain, used for marking linen.

Avocet (*Recurvirostra*), a genus of birds, which, although having the feet webbed nearly to the end of the toes, is usually ranked among the Grallæ or Grallatores, on account of the length of the legs, the half-naked thighs, the long, slender, elastic bill, and the general snipe-like habit. They are distinguished from all other birds, except a few species of humming-bird, by the strong upward curvature of the long slender bill, which is much like a thin piece of elastic

The Common Avocet (*Recurvirostra avocetta*).

whalebone, and adapted as a tactile organ for seeking food in the mud, as their webbed feet are for walking upon it, and their long legs for wading in the fens and marshes which they frequent. The wings are long and pointed; the tail short and rounded. They can move quickly along the ground, and fly swiftly and low. Swimming is only resorted to by accident or compulsion. They scoop through the mud with the bill, first to one side, and then to the other, in quest of worms and other small animals; although Audubon also observed the American Avocet taking insects which were swimming on the surface of the water, and expertly catching them in the air, running after them with partially expanded wings. The avocets are found in most parts of the globe.—The Common Avocet (*R. avocetta*), about the size of a lapwing, is sometimes, though very rarely, found in the fenny districts of England; it is a native of the continents of Europe, Asia, and Africa, occurring even at the Cape of Good Hope.—Other species are natives of North America, India, and New Holland.—The American Avocet (*R. americana*) has the bill less recurved than the Common Avocet.

Avoga'dro di Quaregna, COUNT AMEDEO, physicist, was born in Turin, 9th August 1776. He studied law, and became secretary to a provincial prefecture. In 1809–21 he was professor of physics and mathematics at the Lyceum of Vercelli, in 1821–23 and 1833–50 of higher physics at Turin. He died 9th July 1856. He wrote many memoirs on a variety of physical subjects, but is chiefly famous for 'Avogadro's Law,' enunciated in 1811. See ATOMIC THEORY, and a short Life by Alfonso Cossa.

Avoidance, in ecclesiastical law, signifies the vacancy of a benefice, or the fact of its being *void* of an incumbent. See BENEFICE, CONFESSION.

Avoirdupois', or AVERDEPOIS, is the name given to the system of weights applied normally in Great Britain and Ireland to all goods except the precious metals and precious stones and medicines. The word is derived from the Old French *aveir de pois* ('goods of weight'), the word *aveir* or *avoir* being a noun meaning 'property,' 'goods.' The form *averdepois* was in use in the 17th century.

The grain is the foundation of the avoirdupois system, as well as of the troy. A cubic inch of water, at standard temperature, weighs 252·458 grains. Of the grains so determined, 7000 make a pound avoirdupois, and 5760 a pound troy (see WEIGHTS AND MEASURES).

TABLE OF AVOIRDUPOIS WEIGHT.

27$\frac{11}{32}$ grains	are	1 dram	1 dr.
16 drams or drachms	"	1 ounce	1 oz.
16 ounces	"	1 pound	1 lb.
28 pounds	"	1 quarter	1 qr.
4 quarters	"	1 hundredweight	1 cwt.
20 hundredweight	"	1 ton	1 ton.

A cubic foot of water weighs 997·14 ounces avoirdupois, which gives an easy rule for determining the weight of a cubic foot of any substance from its specific gravity. Avoirdupois is the weight used in the United States of North America, where, however, a cwt., or *cental*, of only 100 lb. has come into general use, and a ton of 2000 lb.

Av'ola (*Abolla*), a seaport town on the east coast of Sicily, 13 miles SW. of Syracuse. It was destroyed by earthquake in 1693, but afterwards rebuilt. The famous honey of Hybla comes from this neighbourhood. There is tunny-fishing, a sugar-refinery, and some trade in agricultural produce. Pop. (1921) 20,137.

Avon, a word of Celtic origin, meaning 'river,' which is the name of several of the smaller British rivers. Of these may be noticed—(1) The Upper or Warwickshire Avon, which rises at Naseby in Northamptonshire, runs south-west through Warwickshire and Worcestershire, passing Rugby, Warwick, Stratford, and Evesham, and joining the Severn at Tewkesbury. It has a course of 96 miles, and receives several tributaries, including the Swift from Lutterworth. Its pretty peaceful course, whose waves rolled Wyclif's ashes towards the sea, and saw the first flights of the 'sweet Swan of Avon,' is finely depicted in twenty-one etchings by Mr Heywood Sumner (Lond. 1881).—(2) The Lower, or Bristol Avon, which rises in North-west Wiltshire, and runs about 70 miles, first south in Wiltshire, and then west and north-west between Gloucestershire and Somersetshire. It traverses an oolitic basin, passing Bradford, Bath, and Bristol, and empties itself into the Bristol Channel. It is navigable for large vessels up to Bristol. It runs generally between deep banks in a rich valley. A canal through the middle of Wiltshire connects it with the Thames.—(3) The Wiltshire and Hampshire, or East Avon, which rises in the middle of Wiltshire, and runs south 70 miles through Wiltshire and Hampshire, passing Amesbury, Salisbury, and Ringwood, and

entering the English Channel at Christchurch. It is navigable up to Salisbury. It abounds in the small delicate loach. In Wales, two rivers named Avon—one rising in Monmouthshire, the other in Glamorganshire—fall into Swansea Bay. In Scotland there are several of the same name, affluents of the Spey, Clyde, and Forth.

Avonmouth, in Gloucestershire, is at the mouth of the Avon, 6 miles NW. of Bristol. The docks, constructed for a railway company in 1880–84, were, like the Portishead docks on the other side of the Avon, acquired by the city of Bristol, and now rank as within the port of Bristol (q.v.); the larger Royal Edward dock was opened in 1908.

Avranches (anc. *Abrincatæ*), a French town in the department of Manche, near the mouth of the Sée, 37 miles E. of St Malo by rail. Till 1801 a bishop's seat, its former cathedral was built in the 18th century on the site of a cathedral consecrated in 1121, in which Henry II. received absolution for Becket's murder. Avranches has manufactures of lace, candles, and salt, and some trade in cider, grain, butter, cattle, &c. Pop. 7000.

Awadh. See OUDH.

Award. See ARBITRATION.

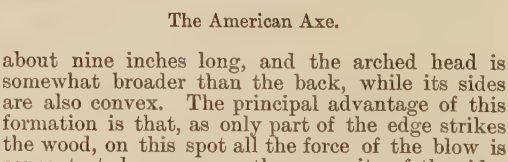
Awe, LOCH, an Argyllshire lake, 22 miles E. of Oban. Lying 118 feet above sea-level, it extends 25½ miles north-eastward, varies in breadth between 3 furlongs and 3½ miles, covers 15 sq. m., and has a maximum depth of 307 feet. The country around consists of mica-slate. The scenery is most striking at the north-east end—originally the head—of the lake, where the water is studded with numerous wooded islets, overshadowed by towering and rugged mountains, prominent among which rises the dark and rocky ridge of Ben Cruachan, 3689 feet high, and 14 miles in circuit. Of the islets, the most noted are Fraoch-Eilean, containing the remains of a castle granted to Gilbert Macnaughton in 1267 by Alexander III.; and Inishail, with its ancient burying-ground, where in 1857 P. G. Hamerton fixed his 'painter's camp.' On a rocky peninsula, in the north end of the lake, stands Kilchurn Castle, once a fortress of great strength, built about 1440 by Sir Colin Campbell of Glenorchy. The waters of the lake are carried off at a north-west corner by the brawling river Awe, which, after a course of 5 miles, enters Loch Etive at Bunawe. The magnificent 'Pass of Brander,' through which the road and railway run beneath the shoulder of Ben Cruachan, was the scene of a conflict in 1308 between Robert the Bruce and the Macdougals of Lorn. The loch has fine trout, *Salmo ferox*, and salmon. Inverliver estate was bought by government for forestry demonstrations.

Aweto (also called Hotete, Anuhe, Weri), a New Zealand grub or caterpillar, eaten with joy by the Maoris. Out of the nape of its neck there grows a fungus (*Sphæria*), seven or eight inches long, curving at the end, which for a length of three inches is covered with brown 'seed.'

Awn (*Arista*), in the flowers of Grasses (q.v.), a solitary pointed bristle, growing either from a glume or a palea. The flowers of some grasses are entirely *awnless;* in many, the glumes alone are *awned,* or only one of them; in others, the glumes are awnless, and the paleæ, or one palea, awned. The awn often appears as a terminal prolongation of the midrib of glume or palea; or it may separate below the point, and is then said to be *dorsal;* or may be jointed at the base, and free from the joint onwards. It may be straight or bent like a knee, or even twisted, and liable to change when moist. Sometimes it is rough, or even serrate, at the edges, as in barley; and sometimes feathery, as in feather-grass (*Stipa*), where it is also remarkable for its great length. The characters of genera and species are often derived from the awn, but it is not always invariable, even in the same species, and the cultivated varieties of wheat and oats differ much in being more or less *bearded.* There appears to be a tendency to the diminution or disappearance of the awn through cultivation. See GRASSES.

Ax, or ACCS, in the French department of Ariège, lies at the foot of the Pyrenees, at the junction of three picturesque valleys, 74 miles SSE. of Toulouse. It is celebrated for its baths, and possesses the hottest sulphur-springs in the Pyrenees, to the number of 80, ranging in temperature from 77° to 172° F.

Axe, an instrument, usually of iron, edged with steel, for hewing timber and chopping wood. The haft or handle is of a length and size suitable for wielding with both hands, and is fitted into a head with an arching edge in the plane of the sweep of the tool—the axe differing in this last respect from the adze, which is found in use amongst some uncivilised peoples that do not use axes at all. Similar instruments of smaller size, for use with one hand, are called hatchets (Fr. *hachette,* diminutive of *hache,* 'an axe'). The usefulness of the implement made it one of the first tools suggested by the needs of man, and, accordingly, among the very earliest archæological relics we find almost invariably some form of axe. The stone axes of our own country are the same as those still in use in many islands of the South Pacific, and the Tomahawk (q.v.) of America finds a close parallel in the 'francisca,' a hatchet for throwing, at one time the national weapon of the Franks. These, and the bronze axes of England and Mexico, with the rough iron instrument of northern nations, all witness the primitive use of this weapon. The prehistoric axe is distinguished from a 'celt' proper (see CELT), which was a chisel, by a more complex shape, and by being bored or otherwise fitted for a handle. Within historic times, the axe has recovered its early importance with the progress of colonisation, and its importance to settlers has led to the invention of the American axe, which effects speedier results with the smallest expenditure of strength. The head of this axe is



The American Axe.

about nine inches long, and the arched head is somewhat broader than the back, while its sides are also convex. The principal advantage of this formation is that, as only part of the edge strikes the wood, on this spot all the force of the blow is concentrated; moreover, the convexity of the sides prevents the blade being caught fast, and facilitates its withdrawal. The handle, which is generally made of hickory or some other elastic wood, is rendered stronger and more elastic by its shape, resembling a half-strung bow. The manufacture of the axe includes more processes than might be supposed. After being cut to the requisite length, and the eye for the handle punched through it, it is pressed into shape between concave dies. With borax as a flux, the edge-piece of steel is now attached to a groove previously prepared, and several processes must follow, including welding, sharpening, tempering, polishing, and varnishing

with a mixture of turpentine and asphaltum, to prevent rust, before the finished instrument is ready for the market. A large quantity of these implements are manufactured in the United States. See also BATTLE-AXE, HALBERT, LOCHABER AXE, TOMAHAWK. The so-called curtal-axe was not an axe. See CUTLASS.

Axel, or ABSALON, from 1177 Archbishop of Lund, and also minister and general to Valdemar I. and Canute VI. of Denmark, was born in 1128, and died at Sorö in 1201. He distinguished himself as well by wisdom and uprightness in peace, as by valour and address in war. The Wendish pirates were driven from the coasts of Denmark, and he defeated the Pomeranian prince, Bogislav. In the wise legislation of Valdemar and of his son, he had a great part. He favoured and promoted learning and art, and to his encouragement we owe the history of Denmark by Saxo Grammaticus. By building a castle, he laid the foundation of the future great city of Copenhagen, then an insignificant village.

Axestone, a variety of the mineral Jade or Nephrite (q.v.). It is of a greenish, grayish, or grayish-white colour, is more or less translucent, hard, tough, and not easily broken. It occurs in Silesia, in Central Asia and China, and in New Zealand and other islands of the Southern Pacific. It derives its name from the use to which it is put by the natives of these islands for making their axes and clubs. They also make eardrops of it.

Axholme, ISLE OF, a low level tract of North-west Lincolnshire, cut off by the Trent from the rest of the county. Measuring 18 by 5 miles, it was anciently a forest, but afterwards became a marsh, which was drained into the Trent in 1625 and succeeding years by Cornelius Vermuyden, a Dutchman, at a cost of £56,000. The reclaimed land became very fertile under Dutch and French Protestant settlers, but, after much litigation, it was in 1691 divided, the original inhabitants receiving 10,532 acres, and the settlers only 2868. For the interesting story of the Isle of Axholme —the Mowbrays, its ancient lords; the wizard-hermit of Lindholme; and Epworth, the home of the Wesleys—see Peck's *Isle of Axholme* (1815), and books named at LINCOLNSHIRE, especially the 'Victoria History' of the county (1900–10).

Axil (*axilla*), in Botany, the angle between the upper side of a leaf and the stem or branch from which it grows. Buds usually grow out from the stem in the axils of leaves, and this position is naturally termed *axillary.*—(2) In anatomical terminology, the axilla is the armpit.

Axim, an important station and port on the Gold Coast (q.v.), a little to the E. of the mouth of the Ancobrah River. Inland from Axim, in the basin of that river, and in the district between it and the Prah, gold-mining has been largely carried on. The harbour is one of the best on the coast.

Axinomancy (Gr. *axinē*, 'an axe,' and *manteia*, 'divination'), a mode of divination much practised by the ancient Greeks, particularly with the view of discovering the perpetrators of great crimes. An axe was poised upon a stake, and was supposed to move so as to indicate the guilty person; or the names of suspected persons being pronounced, the motion of the axe at a particular name was accepted as a sign of guilt. Another method of axinomancy was by watching the movements of an agate placed upon a red-hot axe. This is only one of a multitude of analogous modes of divination practised in all ages and among all nations. See DIVINATION, and DIVINING-ROD.

Axiom, a Greek word meaning a 'decision' or 'assumption,' is commonly used to signify a general proposition which the understanding recognises as true, as soon as the import of the words conveying it is apprehended. Such a proposition is therefore known directly, and does not need to be deduced from any other. Of this kind, for example, are all propositions whose predicate is a property essential to our notion of the subject. Every rational science requires such fundamental propositions, from which all the truths composing it are derived; the whole of geometry, for instance, rests on comparatively a very few axioms. Whether there is, for the whole of human knowledge, any single, absolutely first axiom, from which all else that is known may be deduced, is a question that has given rise to much disputation; but the fact that human knowledge may have various starting-points answers it in the negative. Mathematicians use the word axiom to denote those propositions which they must assume as known from some other source than deductive reasoning, and employ in proving all the other truths of the science. The rigour of method requires that no more be assumed than are absolutely necessary. Every self-evident proposition, therefore, is not an axiom in this sense, though, of course, it is desirable that every axiom be self-evident; thus, Euclid rests the whole of geometry on fifteen assumptions, but he proves propositions that are at least as self-evident as some that he takes for granted. That 'any two sides of a triangle are greater than the third,' is as self-evident as that 'all right angles are equal to one another,' and much more so than his assumption about parallels. Euclid's assumptions are divided into three 'postulates' or demands, and twelve 'common notions;' the term axiom is of later introduction. The distinction between axioms and postulates is usually stated in this way: an axiom is 'a theorem granted without demonstration;' a postulate is 'a problem granted without construction'—as, To draw a straight line between two given points.

Axis, a genus of deer, abundant on the banks of the Ganges, but found throughout India and in many islands of the Eastern Archipelago. It was known to the ancients by the name Axis. One of its Indian names is Chittra or Cheetal, and by British sportsmen in India it is often called the Spotted Hog-deer, though that name is also given to a rarer species. The axis has a great resemblance in size and colouring to the European fallow-deer; it is generally of a rich fawn colour, beautifully spotted with white, nearly black along the back, the under parts snow-white. The horns, however, differ very much from those of the fallow-deer, being slender, sharp-pointed, little branched, and not at all palmate. The female has no horns, and is lighter in colour than the male. The axis frequents thick jungles in the vicinity of water, and feeds during the night. Its spots facilitate concealment in the interrupted light of jungle life. It is commonly found in herds of 15 or 20, of which 3 or 4 are males. Its sense of smell is remarkably acute, and it is generally very shy and timid, so that sportsmen find it difficult to get within range. The males, however, sometimes exhibit great courage in defence of the young. It is gentle and very easily domesticated, has been frequently imported into Europe, and breeds freely, when kept in parks, in Britain and France.

Axis, in Geometry. The axis of a curved line in a plane is a right line dividing the curve into two symmetrical parts, so that the part on one side exactly corresponds with that on the other; as in the parabola, the ellipse, and the hyperbola. The axis of any geometrical solid is the right line which passes through the centre of all the corresponding parallel sections of it: in this sense, we speak of

the axis of a cylinder, a globe, or a spheroid. By the axis of rotation, we understand the right line around which a body revolves.—In physical science, the axis of a *lens* is the right line passing through it in such a manner as to be perpendicular to both sides of it; and the axis of a telescope is a right line which passes through the centres of all the glasses in the tube. The axis of the *eye* is the right line passing through the centres of the pupil and the crystalline lens.

Axis, in Botany, a term applied to the central portion of the higher plants (higher cryptogams as well as phanerogams), which bears the appendages or lateral members arranged upon it. Those plants in which no distinction of axis and appendages can be made out are termed *Thallophytes*, and include algæ, lichens, and fungi. The stem is called the *ascending axis;* the root, the *descending axis.* In the germinating seed, these are distinguished as plumule and radicle. The terminal part of an axis bearing the reproductive organs in flowering plants is called the *floral axis.* This is usually a very short portion, but may be elongated, broadened, hollowed, &c. The notion of a flowering plant as simply an axis with more or less modified appendages serving different purposes, as scale, leaf, petal, stamen, carpel, &c., is older than Linnæus, but was first clearly grasped by the embryologist Wolff, and even more systematically at a later date (1790) by the many-sided poet Goethe. In describing animal forms it is customary to define the disposition of the parts in reference to certain axes, lateral, dorso-ventral, radial, &c. (see MORPHOLOGY).—The term *axis* is specially applied in human anatomy to the second vertebra of the neck (see SPINAL COLUMN).

Ax'minster, a small old town of Devonshire, on the left bank of the Axe, 27 miles E. of Exeter by rail. The parish church, originally cruciform, retains a good Norman doorway. From 1755 till 1835 Axminster was famous for the manufacture of Turkey and Persian carpets (see CARPETS). Dr Buckland was a native. Pop. (urban district), 2000. See Pulman's *Book of the Axe* (1875).

Axolotl (the Aztec word), an amphibian form occurring abundantly in some Mexican lakes, and found widely distributed in the Western United States. It used to be ranked among the forms which permanently retain their gills (*Perennibranchiata*), but more complete observation has shown that it develops into a gill-less adult form (*Amblystoma*) like a salamander. Both forms

A, Axolotl; B, Amblystoma.

were known, and regarded as different kinds of animals, for some time before Dumeril in 1865 observed the passage of the gilled axolotl into the gill-less *Amblystoma.* Marie von Chauvin and others have confirmed the discovery. The fact is that the axolotl is a larval form, which may remain permanently a larva, and may even reproduce without putting on adult characters. This phenomenon of retaining juvenile characters is known in a number of amphibians, and is called neoteny. Some stimulus seems to be lacking, without which the development cannot be completed. It has been suggested that a diminution of the water-supply, an increase of temperature, and certain nutritive conditions bring on the metamorphosis, but the subject demands further investigation. Both forms may be collected from the same lake. The axolotl is plump and short-legged, from 8 to 10 inches in length, of a dark colour with spots, and with the common amphibian character of slightly changing its colour (see CHROMATOPHORES). It bears three feathery gills on each side of its neck. It is esteemed a delicacy in Mexico. See AMBLYSTOMA.

Axum, once capital of an Ethiopian kingdom, is now in the modern Abyssinian province of Tigré, and lies mainly in ruins. Pop. 5000. The former greatness of the city is testified by yet remaining structures cut in granite, of which the most notable are a church, broken columns, and a great obelisk. Some of the ruins bear inscriptions, from which it appears that the Axumite empire extended over Abyssinia, and even over Yemen and Saba in Arabia, and possessed the command of the Red Sea. This country was the farthest point southward that Greek civilisation reached. Under King Aizanes (4th century), Christianity was introduced into the country by the two apostles Frumentius and Ædesius (see FRUMENTIUS). The new doctrine soon spread over the whole country; Frumentius was made the first Bishop of Axum, and the Axumite form of the language became the ecclesiastical language of Abyssinia. The Axumite empire formed the outermost bulwark of Christianity; and, as such, in its interference in behalf of the Christians in Arabia, it became the natural antagonist of Mohammedanism. The contests in which it soon became involved with that power caused its fall.

Ayacu'cho, formerly Huamanga or Guamanga, a town in the Peruvian department of the same name, 220 miles ESE. of Lima. Founded by Pizarro in 1539, it is now a handsome and thriving town. Here, on the 9th December 1824, the combined forces of Peru and Colombia—the latter then comprising Ecuador, New Granada, and Venezuela—totally defeated the last Spanish army that ever set foot on the continent. Pop. 20,000.—The department of Ayacucho has an area of 18,000 sq. m., and a population of 302,000. It consists of elevated plains and deep valleys; agriculture and bee-keeping are the chief industries.

Aya'la, PEDRO LÓPEZ DE (*El Viejo*), was born at Murcia in 1332, of one of the first Castilian families. A brave soldier and able statesman, he filled some of the leading offices under several kings of Castile, and died in 1407. But Ayala's truest title to fame is his *Crónicas de los Reyes de Castilla* (best ed. 1780), which contains the history of Castile from the middle to the end of the 14th century. His *Rimado de Palacio*, begun during his captivity in England (1367), is a didactic and satirical poem of some value.—ADELARDO LÓPEZ DE AYALA (1829–79) was likewise a statesman, and a dramatist and lyrical poet of high merit.

Ayamon'te, a fortified town of Andalusia, Spain, on the left bank of the Guadiana, and near its mouth. Fishing, boat-building, and silk-weaving are carried on. Pop. 13,000.

Ayasaluk, a village on the site of the ancient Ephesus (q.v.).

Aye-aye (*Cheiromys madagascariensis*), a rare and aberrant member of the Lemur family (q.v.).

It inhabits the woods of Madagascar, and was first noted in 1780 by Sonnerat, who was said to have given it the name Aye-aye in reference to the astonished exclamation of some natives when they saw the first specimen of the curious creature

Aye-aye (from Owen).

caught by a European. But more probably the name is onomatopoetic, derived from the cry of the animal, *Hai-hay* (*Hī-hī*). It was for long a puzzle to zoologists; Buffon placed it beside squirrels, and Cuvier was also inclined to regard it as a rodent. It was carefully described by Owen in the *Transactions* of the Zoological Society, 1866, and since the publication of this beautiful and exhaustive memoir, there has been no doubt as to the position of the aye-aye as an aberrant lemur.

It is about the size of a cat, with thick, dark hair; long, bushy, flexible tail; large naked ears, quick to detect the faintest sound; big, well-protected eyes, suited for its exclusively nocturnal and arboreal

Head and Fore-feet of Aye-aye on larger scale. (From Owen.)

labours; rodent-like front teeth, with which it gnaws the branches in search of boring insects; and above all, a peculiar, spidery, hairy hand, with an extremely slender, almost wire-like, third finger, which looks as if it were paralysed, but is used in detecting and picking out the favourite wood grubs. Other characters of the unique hand will be seen in the figure. Its zoological position may be stated as that of a divergent offshoot from a primitive and generalised lemur type with many rodent affinities. It sleeps all day, wrapped in its bushy tail, and often within a nest in a tree-cleft; it is very active at night, creeping along the branches with plaintive grunts, holding firm by its hind-feet, and tapping and probing with its fingers every here and there when its quick ear detects the presence of grubs. It also feeds on fruits, bamboo-pith, sugar-cane juice, and the like, and uses its long fingers very dexterously for drinking purposes. The natives of Madagascar regard this curious animal with superstitious reverence; and its peculiar structure and habits make it one of the most interesting of mammals.

Ayenbite of Inwyt ('Remorse of Conscience'), famous in Middle English literature, was a translation in 1340 by Dan Michel, a monk of St Augustine's, Canterbury, of *Le Somme des Vices et des Vertus*, written in 1279 for Philip III. of France by Frère Lorens.

Ayeshah (also *Aysha* or *Aïsha*), the favourite but childless wife of Mohammed, who accompanied him in his campaigns, was the daughter of Abu-Bekr, born at Medina about 610 A.D. When Mohammed had died in her arms (632), she successfully exercised her influence to prevent Ali, the Prophet's son-in-law, from becoming khalif, and secured the succession for her father, Abu-Bekr. Again on Othman's death she headed a force to resist the accession of Ali, but the troops under her were in 656 defeated by Ali, and she was taken prisoner. She died at Medina (677 A.D.), highly venerated by all true Mussulmans, and named the *Prophetess* and the *Mother of Believers*.

Aylesbury, the chief town of Buckinghamshire, in a fertile vale, on a rivulet flowing to the Tame, 43½ miles NW. of London. Among its buildings are the cruciform parish church, finely restored by Sir G. G. Scott (1849–67), the corn exchange and markets (1865), and the county infirmary (1862). The inhabitants make straw-plait, condensed milk, and dairy-produce, and rear ducks. There is a convict prison for women, with a Borstal Institute for girls. Aylesbury was taken from the Britons by the Saxons in 571. Till 1885 it formed with its hundred a parliamentary borough, with two members. Pop. 12,000.

Aylesford, a village of Kent, on the Medway, 3½ miles NW. of Maidstone. Its remarkable ancient remains include Kits Coty House (q.v.).

Aylmer, JOHN, born in 1521—the ancestral home was Aylmer Hall, Tilney St Lawrence, Norfolk—in 1541 graduated at Cambridge. He became tutor to Lady Jane Grey; in 1553 Archdeacon of Stow; in 1562, of Lincoln, having lived abroad during the Marian persecution; and, finally, in 1577 Bishop of London. Under the designation of 'Morrell,' he is described in Spenser's *Shepheard's Calendar* as the 'proude and ambitious pastoure'—a fair enough estimate of one who showed equal rigour to Catholics and Puritans, and was always quarrelsome and arbitrary. He died 3d June 1594.

Aymer de Valence, Earl of Pembroke, a half-nephew of Henry III., as English Guardian of Scotland, defeated Bruce at Methven (1306), but lost the battle of Loudon Hill (1307). He sided at first with, afterwards against, the Lancastrian party. As Lieutenant of Scotland he shared the defeat and flight at Bannockburn. In 1318 a Burgundian held him to ransom in Germany. He died near Paris in 1324, on an embassy.

Aymestrey Limestone, a well-marked horizon in the Ludlow group of the Upper Silurian. It is a somewhat dark-gray concretionary rock, consisting of thin beds which attain a united thickness in places of 150 feet. It is well developed at Aymestrey, in Herefordshire, near Leominster, but thins off entirely at no great distance from that place. One of its most characteristic fossils is *Pentamerus knightii*, a brachiopod.

Aymon, or HAIMON, Count of Dordogne, whose sons, Alard, Richard, Guichard, and Renaut, were the chief heroes of one of the finest romances of the Carolingian cycle. The story seems to be originally French, and the first known work in which it is found is the poem, *Regnaut de Montauban*, by Huon de Villeneuve, written before 1200. It occurs in a prose collection of similar stories, published at Lyons about 1480, an English translation of which, most likely by Caxton himself, was printed about 1489 (reprinted from unique imperfect Althorp copy for Early English Text Society, 1884–85). The current German story which Tieck worked up, does not appear to be from the French original, but rather borrowed from a Dutch source. Ariosto's *Roland* has secured the brothers a more certain immortality in the part given to Renaud, the youngest and traditionally the bravest of the four.

Ayr, the county town of Ayrshire, at the mouth of the river Ayr, 40½ miles SSW. of Glasgow by rail. It is a clean and handsome town, the principal streets well built; while to the south, towards the racecourse, many elegant villas have sprung up of recent years. The Town's Buildings, with a spire 226 feet high, were erected in 1828, and rebuilt in 1901–2. The so-called 'Wallace Tower' is a Gothic edifice of 1834, 113 feet high. The County Buildings were modelled after the temple of Isis in Rome. The Academy, representing a school extant in 1233, was reconstituted in 1794–98; a new building was erected in 1880. Five bridges span the river, and connect Ayr proper with Newton-upon-Ayr and Wallacetown, two of them being the famous 'Twa Brigs' of Burns. Of these the narrow four-arched 'Auld Brig' (15th century) was restored in 1907–10, and the 'New Brig' (1788) was rebuilt in 1879. There are bronze statues of General Neill, the Earl of Eglinton, and Robert Burns (1891). In the 12th-century church of St John was held Robert Bruce's parliament of 1315. It was turned into a fort by Cromwell, and the lower part of its tower, long a villa, was acquired in 1913 by the Marquis of Bute to save it from the speculative builder. The Carnegie Free Library was opened in 1893. The harbour, formed by the river, is protected by piers and a breakwater; improvements on it, including a wet dock and slip dock, have been carried out since 1874. The chief export is coal from the Ayrshire collieries. A considerable quantity of grain and timber is imported; and there are manufactures of lace and woollen fabrics, carpets, large saw-mills, &c. A splendid new water-supply, drawn from Loch Finlas, 20 miles distant, was introduced in 1887. At an early date Ayr was a commercial and military place of some importance. William the Lion made it a royal burgh about 1200. During the War of Independence, it formed a regular centre of military operations, and in 1297, while in possession of an English garrison, it was the scene (according to Blind Harry) of the burning by Wallace of the 'Barns of Ayr.' The principal objects of interest near Ayr are connected with the memory of Robert Burns (see ALLOWAY). Ayr unites with Ardrossan, Irvine, Prestwick, Saltcoats, and Troon in sending a member to parliament. The municipal burgh was in 1873 rendered conterminous with the parliamentary, so as to take in Newton and Wallacetown, and was again extended in 1885. Pop. of the municipal burgh (1841) 15,749; (1881) 20,821; (1901) 28,697; (1911) 32,986; (1921) 35,741.

Ayrer, JACOB, next to Hans Sachs the most prolific and important German dramatic writer of the 16th century. His history is involved in obscurity; but it is known that he was a citizen of Nuremberg in 1594, and a procurator in the courts of law. His rhyming chronicle of the town of Bamberg was edited by I. Heller in 1838. It was not till after his death, in 1605, that a collected edition of his dramatic pieces was published under the title *Opus theatricum*, consisting of sixty-six tragedies, comedies, and carnival plays (Nurem. 1618). He took his subjects from history, legend, and novels; some pieces are based on English plays. Ayrer has the same garrulous breadth of dialogue as Hans Sachs, but is inferior to him in wit and humour. See the edition by Keller (5 vols. 1865) and the selection by Tittmann (1868).

Ayrshire, a large maritime county in the SW. of Scotland, washed on the W. by the Firth of Clyde and the North Channel. Its greatest length is 78 miles; its greatest breadth, 28; and its area is 1132 sq. m., or 724,523 acres, it being seventh in size of the Scottish counties. The general aspect of the county is undulating and hilly, the land attaining no great elevation, except a small portion in the north, and some considerable tracts in the south and south-east, which are mountainous. None of the eminences exceed 2562 feet, which is the height of Kirrieroch Hill. Loch Doon (5⅜ × ¾ mile) is much the largest of several fresh-water lakes; whilst the chief rivers —only 20 to 38 miles long—are the Ayr, with its tributary the Lugar, and the 'bonny' Doon, which flow across the centre of the county; the Garnock and Irvine in the north; and the Girvan and Stinchar in the south. To Ayrshire belong, too, the first 16 miles of the Nith, which passes out into Dumfriesshire. To the south of the Girvan the rocks are chiefly Silurian; to the north of it are patches of Old Red Sandstone and Carboniferous strata, with both of which igneous rocks are commonly associated. Ayrshire is rich in valuable minerals, especially coal, ironstone, limestone, and freestone. The other minerals have long been wrought, but it was from 1850 that the iron trade rose to great importance. Clays are also valuable. On the banks of the Ayr is found an excellent species of whetstone, called Water-of-Ayr Stone. The climate of Ayrshire is mild and healthy. The soil along the coast is light and sandy, interspersed with deep loam; and this district sends yearly to various markets vast quantities of early potatoes. On the east side are extensive mosses and moorlands. The three ancient divisions of the county are—Carrick, south of the Doon, mostly wild and hilly; Kyle, between the Doon and the Irvine, containing much rich level land, though towards the coast the soil is lighter and less productive; and Cunninghame, comprising all the country north of the Irvine, mostly fertile. Agriculture till 1800 was very backward; but since then extraordinary progress has been made in draining, improved rotation, and road-making; while the condition of the cottars has been much improved. There is a great trade in early potatoes, and carrots and mangolds are much grown. The percentage of cultivated area is high. The farms are generally small. Dairy-husbandry is carried to high perfection in Ayrshire, the breed of milch-cows, of which it rears a greater number than any other Scottish county, being noted as the finest in the kingdom for the quantity and quality of their milk. The Dunlop cheese, so called from the parish of that name, was almost as celebrated as Stilton, but since 1855 has been almost superseded by that made on the Cheddar process. The breed of horses is also excellent. Manufactures, especially woollen and cotton, are carried on to an important extent. There are extensive cotton-works at Catrine; at Kilmarnock, iron-foundries, carpet and tweed factories; dynamite and chemical works near Saltcoats and Irvine; and at Galston and Newmilns much lace is manufactured. Of the minor manufactures, the most characteristic is that of

ornamental woodwork, often bearing tartan designs, which is extensively carried on at Mauchline. Great iron-works exist at Muirkirk, Hurlford, Kilwinning, Kilbirnie, Ardeer, Dalry, and Dalmellington. Ayr and Maybole manufacture shoes and agricultural implements in very large quantities. There are valuable fisheries on the coast, whose headquarters is Ballantrae. Troon, Ardrossan, and Ayr are thriving ports. Pop. (1801) 84,207; (1881) 217,504; (1911) 268,337; (1921) 299,254. Ayrshire and Bute return three members to parliament. The chief towns, besides Ayr, are Kilmarnock, Girvan, Maybole, Dalry, Kilwinning, Beith, Irvine, Stewarton, Old Cumnock, Ardrossan, Saltcoats, Troon, Mauchline, Galston, Newmilns, Kilbirnie, and Largs. Of antiquities, the most interesting are the ruins of Crossraguel and Kilwinning Abbeys; of 'Alloway's haunted kirk,' with the 'auld clay biggin,' Burns's birthplace, hard by; and of the castles of Turnberry (the family seat of Robert the Bruce), Dunure, Loch Doon, Dean, Dundonald, &c. Ayrshire was inhabited in the time of Agricola by the Damnonii, with whom were afterwards mixed the Scots from the opposite coast of Kintyre. It contains the battlefields of Largs and Loudon Hill; and during the religious persecutions of the Stuarts, it was a stronghold of the Covenanters. See James Paterson's *History of Ayrshire* (1847–52), and the publications of the Ayr and Galloway Archæological Association (1878–90).

Ayton, Sir Robert, Scottish poet, was born at Kinaldie, Fife, in 1570, and entering St Leonard's College, St Andrews, in 1584, took his M.A. degree in 1588. For purposes of study he next visited France, whence he addressed, in 1603, an elegant Latin panegyric to King James, on his accession to the throne of England. This poem was the making of Ayton's fortune, for we find him appointed, successively, a gentleman of the bedchamber, private secretary to the queen, and master of requests—posts all continued to him in the following reign. He was knighted in 1612, and employed to convey copies of King James's *Apology for the Oath of Allegiance* to the German courts. Ayton was on terms of familiarity with all the poets, wits, and philosophers of his time—among others, Hobbes and Ben Jonson. He was himself a poet of considerable merit; but, unfortunately, a large number of his effusions being complimentary verses to his friends, are characterised by conceit and extravagant flattery. He was one of the first Scotsmen who wrote in English with any degree of elegance and purity. 'I do confess thou 'rt smooth and fair,' and the prototype of 'Auld Lang Syne,' have been ascribed to him, but on scant authority. He died at Whitehall Palace, February 1638. See his *Poems*, with a Memoir by Dr Charles Rogers (uncritically in 1844, more carefully in 1871 and 1884).

Aytoun, William Edmonstoune, born in Edinburgh, 21st June 1813, was educated at the Academy and the university, and for some months studied German at Aschaffenburg. In 1835 he became, like his father, a Writer to the Signet, and in 1840 was called to the Scottish bar. To his mother he owed his love of ballad-lore and Jacobitism, and, taking early to literary work, he entered in 1836 on his lifelong connection with *Blackwood's;* in 1845 was appointed professor of Rhetoric and Belles-Lettres in Edinburgh University, and in five years increased the number of his hearers fivefold. In 1849 he married a daughter of Professor Wilson; in 1852 was made sheriff of Orkney; and next year received from Oxford the honorary degree of D.C.L. His first two published works—*Poland, Homer, and Other Poems* (1832), and *The Life and Times of Richard I.* (1840), were succeeded in 1848 by *Lays of the Scottish Cavaliers*, which established his reputation as a poet of the school of Sir Walter Scott, and which has run through thirty editions. The *Bon Gaultier Ballads*, a series of capital parodies (1855), were produced conjointly with Theodore Martin, as also were *Poems and Ballads of Goethe* (1858). Other works by him were *Firmilian, a Spasmodic Tragedy* (1854), which is almost too good for a parody; *Bothwell*, a long narrative poem in the measure and manner of Scott; an edition of the *Scottish Ballads* (2 vols. 1858); and *Norman Sinclair* (1861), a semi-autobiographical novel. Aytoun was successful in quite opposite branches of literature—at once as a poet and humorist. His poems exhibit a ballad-like simplicity, and a fiery flow of narration; while his tales possess a certain robust humour and farcical abandonment. His poetical powers appear in their greatest perfection in the *Lays of the Scottish Cavaliers;* the special merits of his humour in *The Glenmutchkin Railway* and *How I became a Yeoman.* As a critic, he took up the knout of 'Christopher North,' which he wielded with no little force and dexterity. He died at Blackhills, near Elgin, 4th August 1865. See his Life by Sir T. Martin (1867), and a book by Miss R. Masson (1899).

Ayuntamiento is the name given in Spain to the councils or governing bodies of towns. Sprung from the institutions of the Romans, and firmly established during the long struggles with the Moors, the ayuntamientos acquired great influence and political power, the nobility being admitted to them without their class privileges. Although this importance was gradually impaired, and under the Bourbons the last shadow of municipal freedom was lost, the remembrance of it continued to be cherished by the people. Accordingly, the cortes, in 1812, adopted the leading features of the former system. On the return of Ferdinand VII., the ayuntamientos were abolished; restored in 1823; after the invasion by France, once more set aside; and again restored in 1837. The ayuntamiento, with the alcalde as president, was appointed by the free choice of the people. The government could provisionally annul its acts, but must afterwards procure the ratification of the cortes. The ayuntamientos were empowered to make up the lists of electors and jurors, to organise the national guards, to command the police within their own bounds, to direct the apportionment and raising of taxes, and to manage the funds of the commune. Subsequently they have been more than once modified, not without opposition, especially after the events of 1843. The municipal law of 1870 deprived them of all political authority, and regulated them as administrative bodies, subject in certain respects to the authorities of the provinces, the law courts, and the cortes.

Ayuthia, the ancient capital of Siam, stands on the Menam, 50 miles N. of Bangkok. It was founded in 1350, and was the capital until 1767, when it was sacked and half destroyed by the Burmese. In the 16th century it was three leagues in circumference, and was till about 1850 the second city of the kingdom. It is known colloquially as Krung-Krao. It is mainly built on piles over the water. Some magnificent buildings still remain, crumbling into ruins and overgrown with luxuriant vegetation; notable amongst them are Buddhist temples, especially the 'Golden Mount,' 400 feet high. Pop. 12,000.

Aza'lea, an old genus of the heath family (Ericaceæ), formerly distinguished from Rhododendron (q.v.) chiefly by the flowers having five stamens instead of ten. Most azaleas also differ from the rhododendrons in having the leaves thin and deciduous instead of evergreen. Perfectly intermediate

forms have now been discovered, and by classifiers the two genera are therefore united under Rhododendron; the distinction, however, remains one of practical convenience. One of the species best deserving of notice is *R. flavum*, a shrub from 3 to 5 feet high, a native of Asia Minor, with lanceolate shining leaves and umbellate yellow flowers, which are externally covered with glutinous hairy glands, and are very fragrant. It may be regarded as, like many of the other Ericaceæ (heaths, &c.), a *social* plant; and its golden flowers give great brilliancy to the landscape in many parts of the Crimea, the south-east of Poland, the Caucasus, &c. It covers many mountain slopes, but does not ascend to great elevations, giving place to the more alpine *Rhododendron ponticum*. It is common in gardens and shrubberies in Britain, and varies with orange, red, and almost white flowers. The whole plant is narcotic and poisonous, and the honey collected by bees from its flowers, which greatly abound in honey, is said to cause stupefaction and delirium, as happened to Xenophon's soldiers in their famous retreat in Asia.—North America abounds in azaleas as well as in rhododendrons, and some of the species have been long cultivated in Britain, particularly *R. nudiflorum* and *R. viscosum*, which, with *R.*

Flowering branch of Azalea (*R. ledifolium*).

flavum, have become the parents of many hybrids. Both have nearly white flowers, very beautiful, and of delicious fragrance. *R. viscosum* has the flowers covered with glutinous hairs like *R. flavum*; but the flowers of *R. nudiflorum* are nearly destitute of them. Both species abound from Canada to the southern parts of the United States. They are taller shrubs than *R. flavum*. Upon account of its sweet smell *R. nudiflorum* is called in America the Upright Honeysuckle. *R. calendulaceum*, a native of the southern parts of the United States, is described as frequently clothing the mountains with a robe of living scarlet.—India and China produce several species of azalea, of which one of the finest is *R. indicum*, well known in Britain as a greenhouse shrub. Its leaves are persistent, and its flowers exhibit great brilliancy of colours. Many hybrids exist between the more hardy species and this. Another extremely beautiful species is *R. ledifolium*, an evergreen, which has been introduced into Britain from China, and is said to be quite hardy.

A diminutive, procumbent, evergreen ericaceous plant, a native of arctic and alpine regions in Europe and North America, plentiful on high mountains in Scotland, was long known as *Azalea procumbens*, but is now called *Loiseleuria procumbens*. The flowers are small, solitary, and rose-coloured. The whole habit of the plant widely differs from that of the ordinary azalea.

Azamgarh, or AZIMGURH ('Azim's fort'), a town in the United Provinces of India. The town is situated on the river Tons, 81 miles N. of Benares. It was founded in 1665 by Azam Khan, a large landholder in the neighbourhood. The Europeans here were compelled to flee during the Mutiny of 1857; the native infantry murdered their officers, and carried off the treasure to Fyzabad. Pop. of town, 11,000, of whom about half are Hindus, the rest Mohammedans.—The district of Azamgarh in the Benares division, is low and remarkably level. The soil is fertile, excepting that tracts, amounting to more than a quarter of the whole, are irreclaimably barren, from being impregnated with soda, nitre, and other saline substances. Magnificent crops of rice, sugar-cane, and indigo are produced. Sugar, molasses, indigo, opium, and coarse cloths are the chief exports; the Gogra River forming the principal highway for trade. Area of district, 2147 sq. m.; pop. 1,500,000. In religion they are mostly Hindus.

Azara, a Mexican and South American genus of shrubs of the Flacourtiaceæ. One stipule is often so great as to look like a second leaf.

Azazel, a name occurring in Leviticus xvi., in the account of the rites of the Day of Atonement, explained by some as the 'scapegoat' which was led out into the wilderness laden with the sins of the people; by others, with much greater likelihood, as a designation of the being to whom the goat was sent—Satan, according to Hengstenberg, or a demon of the pre-Mosaic religion, according to Ewald.

Azeglio, MASSIMO TAPARELLI, MARCHESE D', famous as an artist, a publicist, a romance-writer, and a statesman, was the descendant of an ancient and noble family of Piedmont. He was born in 1798 at Turin, where his father held a high military position. In his fifteenth year, he followed his father to Rome, where he had been appointed ambassador, and there became passionately devoted to the fine arts; but had to accept an appointment in a Piedmontese cavalry regiment. Here he devoted his leisure with such intensity to scientific pursuits, that he brought on an illness which forced him to quit the service. After some difficulty, he got his father's permission to devote himself entirely to painting. A year had hardly elapsed ere Azeglio had made himself a name in Rome as a landscape-painter. On the death of his father in 1830, he went to Milan, and made the friendship of Alessandro Manzoni, whose daughter he married. He now began to make himself favourably known also in literature, his novels, *Ettore Fieramosco* (1833) and *Nicolò de' Lapi* (1841), having done much to fan the national spirit of the Italians. The political affairs of Italy soon occupied him exclusively; he traversed the provinces, cities, and villages, seeking to stir up the spirit of patriotism, and to conciliate the unhappy party divisions, and was everywhere received with rejoicing and acclamation. Azeglio never belonged to a secret political society, but opposed conspiracies as mischievous, and exhorted the impatient to moderation. While in Florence, he wrote his famous piece, *Degli ultimi casi di Romagna*, in which he lashed the miserable papal government, denounced the vain attempts at insurrection, and proved to the Italian princes the necessity of a national policy. After the election of Pius IX. as pope, he returned to Rome, and to his influence were ascribed the reforms with which Pius began his government. When Charles Albert, after the rising of Lombardy, crossed the Ticino, Azeglio left Rome with the papal troops destined to support the Italian contest. In the battle of Vicenza, where he commanded a legion, he was severely wounded. Scarcely was he recovered,

when with his pen he courageously opposed the republican party, now intoxicated with victory. On the opening of the Sardinian parliament, he was chosen a member of the Chamber of Deputies. After the unfortunate event of the battle of Novara, the young king, Victor-Emmanuel II., appointed him (1849) president of the cabinet, and his influence in this high position was most beneficial. At the close of the war in 1859, Azeglio was for a time military commissioner extraordinary for the Roman States. On his retirement he issued a proclamation to the people, which greatly tended to strengthen their resolution by its noble, yet temperate, advice. He died 15th January 1866. He wrote many works, mainly on public questions, and his political correspondence and an autobiographical work, *I miei Ricordi*, were published after his death. See the Lives by Pavesio (1871) and Bianchi (1884); and Bolton King's *History of Italian Unity* (1900).

Azerbāijān', a Tatar republic of the Caucasus, answering roughly to the former Russian governments of Baku and Elizabetpol, is bounded by the Caspian, Daghestan, Georgia, Armenia, and the Persian province of Azerbaijan. The main axis of the Caucasus (reaching 14,700 feet in Bazardyuz) crosses the north of the republic, and runs out into the Caspian as the peninsula of Apsheron, on which stands the capital, Baku, centre of the petroleum-field. The lower part of the Kur basin above, and partly below, the Aras (which for some distance is the Persian boundary) forms the greater part of Azerbaijan, and is made up of mountain and plateau in the west, steppe in the east, the latter dry, but exceedingly fertile under irrigation. The plain of Kuba lies north of the Caucasus; and a stretch of productive coast-land runs southwards from the Kur's mouth. From Baku run a railway and a pipe-line to Batum, a railway to Derbend and other parts of Russia, and one (under construction) to Djulfa to connect with Tabriz and Erivan. Besides petroleum, Azerbaijan produces copper, iron, lead, and cobalt. Cattle are raised. Cotton, vines, mulberry-trees, and rice and other cereals are grown. There is much forest; and the fisheries are valuable. The chief manufactures are petroleum, silk, copper, and carpets. Area 32,950 sq. m.; pop. (1926) 2,301,788 mostly Mohammedan Tatars, with some Armenians, and smaller numbers of Georgians, Kurds, Russians, Germans, and others.

Azerbaijan was ceded by Persia to Russia in 1813. At the revolution of 1917 it became part of the Transcaucasian republic, whose components (Azerbaijan, Georgia, and Armenia) became separate republics in 1918. Fighting between Azerbaijanis and Armenians followed. British troops, campaigning against the Turks, occupied Baku at various periods in 1918–19, while 1920 was marked by the establishment of a Soviet government in Azerbaijan, a treaty with Russia, and fighting between Azerbaijanis and Armenians. In 1922 the Soviet governments of Azerbaijan, Georgia, and Armenia established the Transcaucasian Federation which became in December 1922 one of the original constituent members of the Union of Soviet Socialist Republics. Azerbaijan includes the outlying republic of Nakhitchevan and the autonomous territory of Nagorni Karabagh.

Azerbāijān', or ADERBAIJAN, the ancient *Media Atropatene*, is the north-western province of Persia, adjoining the republic of Azerbaijan. It has an area of about 40,100 sq. m., and a pop. of 2,000,000. The surface of Azerbaijan is very mountainous, many of the ranges rising from 7000 to 9000 feet in height. The peak of Savalan (an extinct volcano), near Ardebil, reaches an elevation of over 13,000 feet. Mount Ararat rises on the north-west border. The chief rivers are the Aras or *Araxes*, the Kara Su, and the Kizil-Uzen. The salt lake Urmia (q.v.), or Urumiah, the largest in Persia, is situated in the west of the province. The climate of Azerbaijan is not unhealthy, but it is subject to rapid extremes of heat and cold. In the mountainous districts the hail-storms are occasionally so violent as to kill cattle. The principal products are rice, barley, wheat, maize, flax, hemp, cotton, tobacco, honey, and saffron; camels, horses, cattle, and sheep are reared; velvet, silks, stuff, carpets, woollens, and leather are the most important articles of manufacture, and a little is done in hardware. Lead, iron, copper, sulphur, saltpetre, and salt are found in the province. The capital is Tabriz; other towns being Urmiah, Khoi, Selmas, and Ardebil. The people are Tatars, Armenians, Kurds, and Persians.

Azhar, EL, a mosque and Mohammedan university of Cairo (q.v.).

Azilian. See STONE AGE.

Azimgurh. See AZAMGARH.

Az'imuth of a heavenly body is the angle measured along the horizon between the north or south point, and the point where a circle, passing through the zenith and the body, cuts the horizon. It is usual to measure the azimuth westward from the point most remote from the elevated pole, beginning at 0°, and returning to it at 360°. Thus, in northern latitudes, where the north pole is elevated, the azimuth is measured from the south point, so that the east point, for instance, has an azimuth of 270° (see ARMILLARY SPHERE). The azimuth circles are those which extend from zenith to nadir, cutting the horizon at right angles, or those in which all the points have the same azimuth.

Azincourt. See AGINCOURT.

Azo Colours. See DYEING.

Azoic (Gr. *a-*, 'without,' *zōē*, 'life'), a term sometimes applied in geology to the Archæan crystalline schists (which underlie the oldest fossiliferous strata, and contain no fossils). See ARCHÆAN SYSTEM.

Azolla. See WATER-FERNS.

Azorella, or BALSAM BOG, a xerophytic genus of Umbelliferae, forming rosettes and cushions similar to Raoulia (see VEGETABLE SHEEP) on the Andes, in southern South America and the Falkland Islands. See TIERRA DEL FUEGO.

Azo'res, or WESTERN ISLANDS, a Portuguese archipelago in the mid-Atlantic, between 36° 55′ and 39° 55′ N. lat., and between 25° 10′ and 31° 16′ W. long. Stretching over a distance of 400 miles, their nine islands are divided into three distinct groups—Sta Maria and São Miguel in the SE.; Terceira, São Jorge, Pico, Graciosa, and Fayal in the middle; and Flores and Corvo in the NW. Of these, Flores lies 1176 miles W. of Cape Rocca in Portugal, 1484 SW. of Falmouth, and 1708 ESE. of Halifax. In 1431–53 the Azores were taken possession of by the Portuguese. They were at that time uninhabited; but that they had been visited by the Carthaginians is proved by Punic coins found on Corvo. They seem to have been known to the Arabian geographer Edrisi in the 12th century; and they are marked distinctly on a map of 1351. The Portuguese colonists called the whole group Azores, from *açor* or *azor*, a hawk; and they named two individual islands Corvo and São Jorge, from Corvi Marini and San Zorze, which, according to a map of 1375, had been previously seen in the western ocean. In 1466 Alfonso V. made a life-grant of the island of Fayal to his aunt, the Duchess of Burgundy. See GRENVILLE (SIR RICHARD).

Though popular as a winter resort, on account of

their moist but equable temperature, the islands are decreasing in population. Total area of the group 922 sq. m.; pop. (1920) 232,012. The area and the maximum altitude of the different islands are as follows: Sta Maria (38 sq. m.; 1889 feet); São Miguel (299 sq. m.; 3854 feet); Terceira (164 sq. m.; 3435 feet); Graciosa (24 sq. m.); São Jorge (91 sq. m.); Pico (173 sq. m.; 7613 feet); Fayal (69 sq. m.); Flores (54 sq. m.; 3087 feet); Corvo (7 sq. m.). The chief towns are Angra (pop. 10,000) in Terceira; Ponta Delgada, in São Miguel (17,600); Horta, in Fayal (6600). The Azores are of volcanic origin, and with the exception of Corvo, Flores, and Graciosa, are liable to eruptions and violent earthquakes (as in 1444, 1591, 1638, 1719, 1841, 1926). Hot mineral springs are numerous; and the baths of Furnas, in São Miguel, are much resorted to by invalids. The coast is generally steep and rugged; the interior abounds in ravines and mountains. As may be presumed from the density of the population, the soil is fertile, and the climate healthy. The islands are also admirably watered. From 80 to 90 per cent. of both fauna and flora are decidedly European; and only of the land molluscs are 60 per cent. indigenous. Pine-apples are the chief article of export, besides tobacco and cigars, wine, brandy, mineral water, beans, tea, maize, fruit, hides, cattle; the imports include coal (for re-export mostly), textiles, hardware, iron, glass, fertilisers, flour, matches, soap, timber, oil, fish, wines, rum, coffee, sugar, salt, and tea. Perhaps the greatest want of the group is a good harbour. The Azores are regarded as an integral part, not a colony, of Portugal (q.v.), and as belonging to Europe.

See Godman's *Natural History of the Azores* (1870), Walker's *Azores* (1886), and Mrs Roundell's *Visit to the Azores* (1889); and a guide-book by A. S. Brown (1905).

Azorín. See MARTÍNEZ RUIZ (JOSÉ).

Azote, a French name for Nitrogen (q.v.).

Azotobacter. See NITROGEN-FIXATION.

Azo'tus. See ASHDOD.

Azov, a seaport of the Don Cossacks country, in the south of Russia, on the left bank of the Don, about 25 miles E. of Rostov, and within 6 or 7 miles of the Sea of Azov. The chief industries are gardening and fishing, but the town trades in grain, and serves as an outlet for the southern part of Russia. The population is about 20,000. Azov was built 9 miles from the site of the ancient Greek colony of *Tanaïs*, and was conquered by Mithradates, 115 B.C. It was successively under the rule of the Sarmatians, Huns, Khazars, and the Petchenegs, and was captured by the Russian prince Vladimir I. in the 10th century. When in the 13th century it was taken possession of by the Genoese, they altered its name to *Tana*, fortified it by high walls and towers, and it became the commercial centre for the Indo-Chinese trade. They were driven out of it and the town sacked by Timur (Tamerlane) in 1392. In 1471 it was taken by the Turks, in 1696 by Peter the Great; and to Russia it was finally ceded in 1774 by the treaty of Kutchuk-Kainarji. It was bombarded and greatly injured by an allied English and French squadron in 1855.

THE SEA OF AZOV, named after the town, is a large gulf of the Black Sea, formed by the Crimean peninsula, or rather an inland lake connected with the Black Sea by the Strait of Yenikale or Kertch (anc. *Bosporus Cimmerius*), 28 miles long, and barely 4 wide at the narrowest. The intricate Siwash or Putrid Sea, which is a mere succession of swamps, is cut off from the western portion of the Sea of Azov by the long narrow slip of low sandy land called the Peninsula of Arabat. The ancient name of the Sea of Azov was *Palus Mœotis* or 'Mœotic Marsh,' from the Mœotæ dwelling on its shores; by the Turks it is called *Balik-Denghis*, or 'Fish Sea,' from its abundance of fish, in which it is scarcely equalled by any other sheet of water of like extent. The water is almost fresh, but varies considerably. The whole sea is shallow, from 3 to about 40 feet deep, and it is becoming shallower. Measuring 235 by 110 miles, it occupies an area of 14,500 sq. m. Its shores are generally low and sandy, with here and there a short strip of rocks. At its north-east extremity it becomes narrow and forms the Gulf of Taganrog. It has three ports, Taganrog, Mariupol, and Berdiansk. The sea receives several large rivers, the most important being the Don, near whose mouth the town of Azov is situated. A ship-canal across the Isthmus of Perekop, projected in 1888, was not constructed.

Azpeitia, a town in the Spanish province of Guipúzcoa, situated in a fine valley on the Urola, 18 miles SW. of San Sebastian. A mile from it is the famous convent of Loyola, now converted into a museum, built somewhat in the form of an eagle with outspreading wings by the Roman architect, Fontana, in 1683. It comprises a tower of the Santa Casa, in which St Ignatius of Loyola, the great founder of the Jesuits, was born in 1491. Here every year in July a great festival is held in his honour, to which pilgrims flock from all quarters. Pop. about 7000.

Azrael, also called Raphael, forms in Moslem mythology, together with Gabriel, Michael, and Israfil (or Uriel), the group of four highest angelic beings who surround the throne of God. Called the 'Angel of Death,' it is he who 'separates men's souls and bodies,' and with his assistants either 'tears them asunder with violence, or draws them apart with gentleness.' He is sent by Allah, and executes his commissions, having been promoted to his high office for his faithfulness and fearlessness. No unkindly idea is attached to him in the Moslem mind—he seems rather to have been identified with Fate, without any special malignant quality inherent in his nature. The Jewish rabbins have added to this awful figure the attributes of an evil genius, and 'the king of terrors,' the last enemy of man, in their conceptions has become almost the supreme embodiment of evil. See MOHAMMED.

Azrek, BAHR EL, the Arab name for the Blue Nile. See NILE, ABYSSINIA.

Aztecs, the race dominant in Mexico from the time they succeeded to the Toltec culture till they were conquered by the Spaniards. For their history and polity see MEXICO. But though the name is usually extended to all the semi-civilised tribes of Nahuatlan (*Aztlan*, 'heron clan') stock in central and southern Mexico, it properly belongs only to a small group of seven related clans occupying the valley of Mexico and the adjoining country. Their tradition was that they had come from the north. The principal tribe had its capital at Tenochtitlan, now the city of Mexico, and by successive wars of conquest gradually acquired dominion over nearly all the tribes of southern Mexico, thus founding the empire of Mexico. Although possessed of a high degree of culture, the Aztecs were notorious for their cruelty and the bloody concomitants of their religious rites. Some of their descendants, comparatively pure in blood and retaining the ancient language, are still to be found in the outlying villages in the country round the city of Mexico. Individuals said to belong to this race, or even to the royal family, were repeatedly exhibited in Europe in the second half of the 19th century; and the physical peculiarities of these specimens, showing a melancholy degradation of mind, body, and

especially of skull formation, has led to a special type of idiocy being called the Aztec type. It is marked by a low, retreating forehead, a projecting, sharp nose, and a weak, retreating chin; the face and head having altogether a strangely bird-like look.

Azua, capital of a like-named province of San Domingo, in the island of Hayti, on the Bia River, 60 miles W. of the town of Santo Domingo, with sulphur springs and a population of 20,000.

Azuaga, a town of Spain, in the province of Badajoz, 54 miles NW. of Córdoba, with which it is connected by rail; pop. (1920) 16,577.

Azuay, a province in the south-west of Ecuador, named from El Azuay, a mountain mass in the eastern Cordillera, has an area of over 11,000 sq. m., and 135,000 inhabitants, mainly Indians. Agriculture and cattle-raising are the chief occupations. On its mountainous slopes the cinchona-tree grows abundantly. The capital is Cuenca (q.v.).

Azul, a cattle centre in the province of Buenos Aires, in Argentina, on the river Azul and the railway to Bahía Blanca; pop. 30,000.

Azulejos is one name for the blue glazed tiles (Span. *azul*, 'azure') made by the Moslems of Persia, Egypt, and Spain for decorating wall surfaces. Some patterns were repeated century after century, and the Spaniards, who inherited the art of making them from the Moors, modified the designs and colours so slightly that it is not easy to distinguish between a Renaissance and an early medieval Spanish tile. The name is sometimes extended so as to cover Dutch blue tiles. See TILES, PERSIA.

Azun, a valley, sometimes called 'the Eden of the Pyrenees,' in the SW. of the French department of Hautes Pyrénées, watered by a tributary of the Gave de Pau.

Azuni, DOMENICO ALBERTO, a distinguished jurist, born at Sassari, in Sardinia, in 1749. He became judge of the Tribunal of Commerce at Nice, and in 1795 published a work in which he endeavoured to reduce maritime laws to fixed principles, and which appeared in French in 1805 under the title of *Droit Maritime de l'Europe.* Napoleon appointed him one of the commissioners for compiling the new commercial code; and in 1807 he was appointed president of the Court of Appeal at Genoa. He published other minor works on various branches of maritime law, and a book on Sardinia. Ultimately he received a post at Cagliari, where he died on the 23d January 1827.

Azure, a French word technically used in Heraldry to signify blue. In engraving arms, it is always represented by horizontal lines.

Azurine, or BLUE ROACH, of Knowsley, in Lancashire, described by Yarrell as a distinct species, *Leuciscus cæruleus*, allied to roach and rudd. It was distinguished mainly because of its colour—silvery, with a slate-blue back and pale fins. Ichthyologists now regard it simply as a Red Eye (q.v.) or Rudd (*Scardinius* or *Leuciscus erythrophthalmus*). It is a fresh-water fish, and though very rare in Britain, is not uncommon in some parts of the Continent—e.g. in some of the Swiss lakes.—Azurine is also the name of a blue-black aniline dye.

Azurite, a name which used to be given to the mineral more commonly called Lazulite (q.v.), to which, along with Lapis Lazuli (q.v.) or *Azure-stone*, mineral turquoise (see TURQUOISE), &c., the generic name *Azure Spar* is sometimes given.—The name azurite is also applied by mineralogists to an ore of copper, generally known as *Blue Copper* or *Chessylite* (see COPPER), nearly allied to Malachite (q.v.), and remarkable for its beautiful azure colour. Siberian azurite is cut into slabs and used as veneering for tops of tables, mantelpieces, and the like. Crystals of azurite, found in Arizona, are prized as gems, although they are too small to have a recognised commercial value as such. In various parts of the United States amorphous azurite is utilised as a valuable copper ore; it may even be made to serve as a blue pigment.

Azygy is a term in anatomy for 'singleness' as used of any structure or part which has no fellow on the opposite side of the body; thus the sphenoid, some single veins, the thyroid gland, are said to be azygous (Gr. *azygos*, 'unwedded'). The *azygos uvulæ*, the muscle of the uvula, was so named under the mistaken idea that it was a single muscle, while it is really a conjoined pair. The azygous artery is an artery of the knee-joint. The azygous veins are three veins of the trunk—one on the right side and two on the left.

Azymites, a name given reproachfully by the Orthodox Eastern Church to the Western, because the Western Roman Communion insisted that in the eucharist unleavened bread (Gr. *a-*, 'not,' and *zymē*, 'leaven') should be used, whereas the Greeks consecrated only leavened bread (see HOST). The use of unleavened bread in the Latin Church may be traced to the 9th century, and figured in the long and bitter controversy between East and West from the 11th century (see GREEK CHURCH); and the authoritative longer catechism prepared by Archbishop Philaret (q.v.) in 1839 maintains the oriental doctrine with unabated energy as demanded by the name of bread, by the holiness of the mystery, and by the example of Jesus Christ and the apostles. Armenians and Maronites also use azyms or azymes—a term also extended to the Jewish unleavened bread (see PASSOVER).

B

the second letter of our alphabet, descends from the second letter of the ancient Semitic alphabet. The earliest known form of this letter (9th century B.C.) is . Its original name, represented by the Hebrew and Syriac *bēth*, and adopted by the Greeks as *bēta*, is probably identical with the Semitic word for 'house' (Assyrian *bītu*, Hebrew *bâyith*, Syriac *baithō*). It is possible that the prehistoric original form of the letter was a rude drawing of a house, but the oldest known form affords no evidence of this; the common hypothesis that the 'house' referred to was a tent is unlikely, as the inventors of the alphabet were probably not tent-dwellers. In the Aramaic variety of the Semitic script the letter was opened at the top, assuming the form , whence the 'square Hebrew' and the Syriac .

In early Greek inscriptions the letter had many forms, curiously different from each other and from the Semitic prototype. One of these forms was , which may perhaps have been evolved from the Semitic by turning the tail round to meet the stem. When the original right-to-left direction of the writing was reversed, this became , which, rounded into , ultimately superseded all the other forms.

The Romans adopted the letter in the form , and shortened its name *bēta* into *bē*, on the pattern of which they formed the names of the other letters denoting stopped consonants, *cē*, *dē*, *gē*, &c. In Roman cursive the upper loop of the letter was omitted, so that its form became b (there was a variant d, which is not so easy to account for). The derivation of the modern script and printed forms of the letter, capital and minuscule, from the Roman B, b, is in general too obvious to need explanation. The only form that is at first sight puzzling is the German script capital . This is an alteration of an earlier (the origin of which is evident), the right-hand loop being opened and lowered to facilitate joining with the following letter. The minuscule script is the result of a similar process.

The sound which the letter originally expressed in Semitic, and with which it was adopted by the Greeks and from them by the Romans, was that of our English *b*—the bilabial voiced stop. In many languages independently, this sound has, in certain positions, changed into the corresponding spirant—i.e. into a bilabial *v*, which sometimes underwent further development into the dentilabial *v* (as in *vine*). Where this sound-change occurred without producing an alteration in the mode of writing, the letter B or its equivalent necessarily acquired a new phonetic value. Thus in later Hebrew and Aramaic, though not in the other Semitic languages, it is sounded as *v* (bilabial) when following a vowel, but elsewhere as *b*. (In 'pointed' Hebrew and Syriac texts this diversity of pronunciation is indicated by diacritic marks.) In modern Greek B is pronounced *v*, and with this power it was adopted into the Slavonic alphabet, which has a new letter ( ) for *b*. In late Latin B between vowels was pronounced *v*; of the modern descendants of Latin, Spanish alone retains the Latin symbol (as in *haber*), while the others write V (Italian *avere*, French *avoir*, Portuguese *haver*). In the earliest Old English the sound *v* was, after Latin example, expressed by B; later this was replaced by F. In Continental Old Saxon the spirant sound (=*v*) was distinguished from the stopped sound of the letter by using the 'barred' form for the former. In Irish the letter had originally both its late-Latin values; later Irish, when written in the native character, expresses the spirant sound by ; when ordinary Roman letters are used, this is represented by *bh*, which is also similarly used in Scottish Gaelic.

In various languages the sound of *b* has minor diversities of articulation that cannot be noticed here. It may be mentioned that 'voiced' consonants are usually uttered with less force than the related 'voiceless' ones (whence the designation 'soft' applied to *b* in contradistinction to the 'hard' *p*), and that in some German dialects the difference between *p* and *b* (which are both voiceless) is merely that the latter is 'softer.'

B, in Music, is the seventh degree of the diatonic scale of C. In the German notation B is called H, while B flat is called simply B. See MUSIC, H.

Baader, FRANZ XAVER VON (1765–1841), born at Munich, studied medicine and (in England) mining engineering. Hume's philosophy jarred terribly on his deep sense of the reality of religious truths. Indeed, he regarded all modern philosophy as atheistic in its tendencies, and the ethical autonomy of Kant, that man is in himself a rule of action, was particularly offensive to him. He became superintendent-general of mines, and retired in 1820. In 1826 he was appointed professor of Philosophy and Speculative Theology in the new university of Munich. His philosophy draws its inspiration from Jacob Boehme (q.v.), and is essentially a theosophy, of which the notion of God is the fundamental idea, the divine nature its first problem. His system is based largely on the necessary *attributes* of God. He holds that the true ethical end is not obedience to a moral law, but a realisation of the divine life; and that as man, alienated from God, has lost the power to attain this, therefore no ethical theory which disregards the facts of sin and redemption can be satisfactory.

Ba'al, the principal male deity of the Phœnician and Canaanitish nations, as Ashtoreth was the principal female deity. The Bel of Babylon and Assyria and the Phœnician Baal both bore the title of Bel-Ba'ab, 'lord;' and the name probably belonged to many local gods. Baal, the ruler and vivifier of nature, became a sun-god; later his sovereignty in the moral world also was conceived.

The oldest form of his cultus was a nature-worship on the tops of mountains; thus the Midianites and Amalekites worshipped him on Horeb and Sinai, the Moabites on Mount Peor, the Phœnicians particularly on Carmel, the Canaanites of the interior on Hermon. There were no representations of Baal, but his presence was symbolised by upright conical stones, which in earlier times were erected in the open air, but later in temples, and are supposed to have had a phallic significance. In contrast to Baal, the genial and fructifying power of nature, stood Moloch, the god of the sun in his destructive side, and the personification of the sterner side of nature. Later both conceptions were united together in the person of Melkart, the supreme god of the Phœnicians. Melkart is usually supposed to mean 'king of the city'—i.e. Tyre. The Greeks confounded Baal or Melkart with their own Herakles, and for the purpose of distinction termed him the Tyrian Herakles. From the foundation of Tyre, he seems to have been the tutelar god of that city, and his worship apparently extended thence until it was prevalent in all the towns of the Phœnician confederation, and was established in their remotest colonies, such as Malta, Carthage, and Cadiz. The worship of Baal had a powerful fascination for the early Israelites before the idea of a pure monotheism had been fully grasped by the popular imagination.

The word enters into the composition of many Semitic names, as Jezebel, Hasdrubal, Hannibal, Baalbek. It is often found in conjunction with some epithet, denoting a different deity, or possibly the same regarded in another aspect, and as exercising merely a different function. Thus, we have Baal-Berith ('the Covenant Lord'), who was specially worshipped by the people of Shechem; Baal-Peor, the Priapus of the Moabites and Midianites; and Beelzebub, or Baalzebub ('the Fly-god'), the idol of the Philistines at Ekron, where he had a temple.—The Celtic deity Beal was often confounded with Baal by the earlier mythologists.

Baalbek, a ruined city of Syria, on the Damascus-Aleppo railway, 35 miles NNW. of Damascus. The name ('City of Baal,' the Sun-god) was by the Greeks translated 'Heliopolis.' It was the most magnificent of Syrian cities, full of palaces, fountains, and beautiful monuments. The most imposing ruin is that of the Great Temple, which

Ruins of the Great Temple at Baalbek, with the Lebanon Range. (From a Photograph by Frith.)

was a rectangular building, 290 feet by 162, having its roof supported by a peristyle of 54 Corinthian columns, 19 at each side, and 10 at each end. Of these, six are yet standing. The circumference of these columns is 22 feet, and the length of the shaft 55½; with pedestal, capital, and entablature, they measure 88 feet in height. The approach to this temple was through a portico (40 × 248 feet), a hexagonal hall (193 × 255 feet), and a grand quadrangle (411 × 440 feet). Except the columns mentioned, little of the great temple, or of the buildings in front of it, is left standing, but the ground is covered with their ruins. The vast size of the stones used in the Cyclopean substruction or platform (1052 × 318 feet) is remarkable, three of them being more than 60 feet long and about 13 feet square. South of the great temple is a smaller one, known as the Temple of Bacchus. It is similar in form, having its peristyle and the walls of its cella still mostly standing. Its dimensions are 228 feet in length by 124 feet in breadth, being thus larger than the Parthenon at Athens. Both temples, as well as the surrounding structures, are built of limestone, in a richly decorated somewhat fantastic Corinthian style. Besides these, there stands in the village of Baalbek, at the distance of 300 yards from the others, a circular building, supported on 6 granite columns in mixed Ionic and Corinthian style. Down to the 18th century it was used as a Greek church.

The early history of Baalbek is involved in darkness; but it is certain that, from the most distant times, it had been a chief seat of sun-worship, as its name implies. Julius Cæsar made it a Roman colony, and under Augustus it was occupied by a Roman garrison. Baalbek had an oracle held in such high esteem that in the 2d century A.D. it was consulted by the Emperor Trajan prior to his entrance on the second Parthian campaign. Antoninus Pius (138–161 A.D.) built the Great Temple, which the natives nowadays ascribe to Solomon. This temple is said to have contained a golden statue of the sun-god, which on certain annual festivals the chief citizens of Heliopolis bore about on their shoulders. When Christianity had become the dominant religion, the Emperor Theodosius the Great built a Christian church in the great quadrangle. In the wars that followed the taking of the city by the Arabs, who sacked it in 748 A.D., the temple was turned into a fortress, the works of which are yet visible. The city was completely pillaged by Timur Beg in 1400. Both city and temple continued to fall more and more into decay under the misery and misrule to which Syria has been subject ever since. Many of the magnificent pillars were overturned by the pashas of Damascus merely for the sake of the iron with which the stones were bound together. What the Arabs, Tatars, and Turks had spared was destroyed by a terrible earthquake in 1759. After 1901 the German Archæological Institute carried out extensive clearances, and propped up many blocks and masses threatening to fall; the plans of the greater buildings are now much more fully known.

See R. Wood and Dawkins's *Ruins of Baalbec* (1757); Renan's *Mission de Phénicie* (1864); Frauberger's *Akropolis von Baalbek* (1891); Puchstein's *Führer durch die Ruinen v. Baalbek* (1905); Wiegand's *Baalbek* (1921 *et seq.*).

Baba ('the old'), in Slavonic Mythology, originally a thunder-witch (the devil's grandmother), was represented as a little, ugly old woman, with a monstrous nose, long teeth, and dishevelled hair, flying through the sky in an iron mortar.

Baba, a Turkish word signifying 'father,' originating, like our word *papa*, in the first efforts of children to speak. In Persia and Turkey it is prefixed as a title of honour to the names of ecclesiastics of distinction, especially of such as devote themselves to an ascetic life; it is often affixed in courtesy, also, to the names of other persons, as Ali-Baba.

Baba, CAPE, a bold rocky headland near the western point of Anatolia—the *Lectum* of the Greeks—about 12 miles from the northern extremity of Mitylene, the ancient Lesbos.

Babassu, an oil-yielding nut, from Brazilian palms of the genus Attalea (q.v.).

Babatag, or BABADAGH, a city of Rumania, with 3000 inhabitants, in a marshy district of the Dobrudja, 2½ miles W. of Lake Razim. The importance of the place has declined since the Dobrudja ceased to be Turkish in 1878.

Babbage, CHARLES, born 26th December 1791, at Totnes, Devonshire, entered Trinity College, Cambridge, in 1811, but graduated from Peterhouse in 1814. Two years later he was elected an F.R.S., and from 1828 to 1838 he filled the sinecure of Lucasian professor of Mathematics at Cambridge. He united, in the most happy combination, powers of invention and observation with thorough scientific culture. Foremost among his eighty writings is his extremely correct and well-arranged *Table of Logarithms* (1827), he being the first to make the method of constructing such tables the object of earnest study. As early as 1812 the idea had occurred to him of a Calculating Machine (q.v.); and by 1822 he had constructed a small model of one. Commissioned by government to superintend the construction of a larger and improved machine, after four years' operations he devoted a twelvemonth to visiting a great many workshops and factories on the Continent, in order to become acquainted with all the resources of mechanical art, and thus be in a position to use them in his great undertaking. This survey afforded him the necessary information for his able work *On the Economy of Manufactures and Machinery* (1832)—a book that in three years ran through four editions, and was translated into four languages. In it all mechanical processes are classified from the most scientific point of view, and the most interesting examples of the more important kinds of manufacture are described. Besides his *Comparative View of the Various Life-assurance Societies* (1826), *Ninth Bridgewater Treatise* (1837), *Decline of Science* (1831), *The Exposition of 1851* (1851), and the autobiographical *Passages from the Life of a Philosopher* (1864), Babbage contributed many very interesting papers to the Transactions of the Royal Societies of London and Edinburgh. His calculating machine, which cost £6000 of his own money, and £17,000 of the nation's, was abandoned by government in 1842, after eight years of circumlocution, and is now preserved in an unfinished state in the South Kensington Museum. In his later years he was chiefly known by his fierce hostility to organ-grinders. He died 18th October 1871.

Bâb-ed-Din. See BÂBÎ.

Babel, TOWER OF. According to the story in Gen. xi., the nomadic Semitic tribes journeyed eastwards, and entered the plain of Shinar (a Hebrew term for Babylonia). Settling there, they determined to build a city and a tower whose top should reach to heaven. Their project roused the jealousy of Jehovah, and as a punishment for their presumption he determined to 'confound their language that they might not understand one another's speech,' and scatter them over the face of the earth. The name of the city was henceforth called Babel, or confusion (Hebrew *balbel*). This explanation of the word, however, is due to false etymology. Babel is not derived from the Hebrew *balbel*, but from the Assyrian *Bab-ili* = 'the gate of God.'

The tower which was projected evidently resembled the Babylonian *zikkurat*, which was the most conspicuous feature of the temples in Babylonia. The *zikkurat* was a huge pyramidical tower rising in seven terraces from the centre of the temple-area, and crowned with a shrine at the top.

It used to be thought that a Babylonian parallel to the Genesis story had been found in some fragments of a cuneiform text discovered by George Smith (British Museum Inscription K3657). The cuneiform mentions certain men who repudiated the father of all the gods, and began to build in Babylon 'a mound' or hill-like tower, but the winds blew down their work, and Anu confounded great and small on the mound, as well as their speech. Most modern scholars, however, deny that there is any connection between the two stories. The crucial words for 'tower' and 'speech' in the cuneiform are of uncertain meaning. Moreover, as Gunkel and Driver have pointed out, 'the narrative reflects the impression which Babylon would make upon a foreigner rather than that which it would make upon a native: the unfavourable light in which the foundation of Babylon is presented, the idea that the erection of what can hardly have been anything else than a Babylonian *zikkurat* was interrupted by a Babylonian deity, the mention of brick and bitumen as unusual building materials, and the false etymology of the name Babel are all features which are not likely to have originated in Babylonia.'

It is not unlikely, however, that some gigantic pyramidical tower in Babylon which was left uncompleted or allowed to fall into a state of disrepair may have formed the original basis of the story. Some scholars have identified the tower with the *zikkurat* of E-zida in the temple of Nebo at Borsippa, which we know from inscriptions was left unfinished till the time of Nebuchadrezzar, and the ruins of which still survive in the pyramidical mound known as *Birs Nimrud*. Others think that the origin of the story is more likely to be found in the tower of E-sagil in the famous temple of Marduk in the city of Babylon itself.

But whatever may be the origin of the story, there is no doubt as to its meaning and significance. As soon as men began to reflect at all, they were bound to ask themselves the question, How can the diversity of races and the diversity of language be explained? The story of the tower of Babel supplied an answer which was suited to the comprehension of a primitive race. As Bishop Ryle, in his *Early Narratives of Genesis*, puts it: 'Just as Greek fable told of the giants who strove to scale Olympus, so Semitic legend told of the impious act by which the sons of men strove to raise themselves to the dwelling-place of God, and how Jehovah interposed to frustrate their purposes.' The story, therefore, must not be explained as literal history, but rather as an early and naïve attempt on the basis of myth to explain a difficult problem.

See BABYLONIA; Ryle, *Early Narratives of Genesis;* Sayce, *Chaldean Account of Genesis;* commentaries on Genesis by Delitzsch, Dillmann, Driver, and Skinner; Gunkel, *Schöpfung und Chaos in Urzeit und Endzeit* (1895).

Bab-el-Mandeb (i.e. 'the gate of tears'), so called from the danger arising to small vessels from strong currents, is the name of the strait between Arabia and the continent of Africa, by which the Red Sea is connected with the Gulf of Aden and the Indian Ocean. The Arabian peninsula here throws out a cape, bearing the same name as the strait, rising to the height of 865 feet. About 15 miles distant from this cape stands the wall-like coast of Africa, rising in Râs es Sean to the height of over 400 feet. Within the straits, but nearer to Arabia, lies the bare rocky island of Perim (q.v.), since 1857 occupied by the British as a fort; its guns command the entrance to the Red Sea. The strait on the east side of this island is called the Little Strait, and that on the west the Great Strait.

Bab'er (Zehir-Eddin Mohammed), the first of the Great Moguls in India, a descendant of Timur, was born in 1483. He was barely 12 years of age when he succeeded his father, Omar Sheikh Mirza, in the sovereignty of the countries lying between Samarkand and the Indus. Driven more than once from his paternal dominions by the usurpation of his uncle and the revolts of his nobles, he made himself master, by prompt and daring movements, of the provinces of Kashgar, Kunduz, Kandahar, and Kabul. Having thus opened the way to India, he made two or three rapid incursions into Hindustan; and finally, about the end of 1525, taking advantage of the feeble government of Ibrahim Lodi, the Afghan emperor of Delhi, he crossed the Attock (the Kabul branch of the Indus), quickly defeated some bodies of troops that opposed him in the Punjab; and at last, in April 1526, on the plain of Panipat, not far from Delhi, encountered and fought a decisive battle with his enemy, whose army was far superior in numbers. The 100,000 men and 1000 elephants of Sultan Ibrahim were dispersed; Ibrahim himself fled; and Baber made his entry into Delhi. In the following month, Agra, the second city of the empire, surrendered. Baber's enjoyment of empire in India was brief; he died in 1530, having had to contend during the five years of his reign with numerous conspiracies and revolts. To the talents of a general and statesman, which he manifested alike in his conquests, his improvements of public roads, measuring of lands, adjustment of taxation, and his postal arrangements, Baber (which means 'the Tiger') united a taste for science and art. He wrote Turki poems (ed. Ross) and a vivid and entertaining history of his own life, which was translated (from the Persian) by Leyden and Erskine (1826; revised 1921), Mrs Beveridge (1912 *et seq.*); abridged by Caldecott (1844) and Talbot (1910). His daughter Gul Badan Begam's memoirs (*The History of Humayun*) are also extant (trans. by Mrs Beveridge, 1903). 'Baber the Turk,' though founder of the 'Mogul' dynasty, regarded actual Mughals, or Mongols, with dislike. He was succeeded by his son Humayun. See INDIA, and Stanley Lane Poole's *Bábar* (1899).

Babeuf, FRANÇOIS NOEL, communist, was born in 1760 at St Quentin, was a land-surveyor in Picardy, and on the breaking out of the Revolution became a keen revolutionary; in 1790 he received honourable mention from Marat in his paper, *The Friend of the People.* As one of the extreme left, he opposed Robespierre during the Reign of Terror. In 1793 Babeuf had started a newspaper, to which in 1794 he gave the name of *Tribune of the People;* and he began to sign himself 'Gracchus Babeuf.' In this paper he advocated the most violent measures; particularly a rigorous system of communism, by which private property should be abolished, and the fruits of the common industry placed in a common magazine, from which they should be distributed with the most scrupulous equality. A secret conspiracy was formed, the aim of which was the destruction of the Directory and the establishment of an extreme democratic and communistic system. The plot was discovered, and Babeuf and other chiefs were brought to trial. Babeuf was condemned to death, and guillotined in 1797. He was an enthusiast, without talent or culture, but was a forerunner of the social revolution. See E. Belfort Bax, *The Last Episode of the French Revolution* (1911).

Bâbî, a modern Persian sect, derived from the title, *Bâb-ed-Din* ('gate of the faith'), assumed by its founder, Mirza Ali Mohammed, born at Shiraz in 1821, who in 1844, after a pilgrimage to Mecca, undertook to form a new religion from a mixture of Mohammedan, Christian, Jewish, and Parsee elements. His controversies with the *mollahs* shortly led to his confinement in various towns, where he formulated his doctrines, privately instructed his disciples, and increased his claims. He sent out missionaries in various directions, the most famous of whom was a woman, Gurred-ul-Ain ('consolation of the eyes'), remarkable for beauty and intelligence, and skilled in poetry, who preached against polygamy. The sect soon became numerous, and were not molested by the reigning shah; but on the accession of Nasir-ed-Din in 1848, apprehending persecution, they took up arms. Several Persian armies were routed, but finally the insurgents were reduced by famine, and most of them executed (1849–50). The Bâb had held aloof from the revolt, but he was arrested and put to death, after imprisonment, in 1850. An attempt of three believers to assassinate the shah in 1852 led to a terrible persecution of the sect, when Gurred-ul-Ain was put to death with many others. The Bâb's successor was found in a Teherani, Mirza Huseyn Ali, born in Nur in 1817, to whom was given the name Baha-Ullah ('splendour of God'). He was believed by the great majority of the Bâbîs—now known as Bahais, or Behais—to be the most complete incarnation of the Son of God, foretold by the Bâb, though a small party (Ezeli) adhered to his half-brother Mirza Yahya, called Subh-i-Ezel. Baha-Ullah and others had taken refuge from persecution at Baghdad, whence they were removed by the Turkish government to confinement in Constantinople, in Adrianople, and finally in Acre, where he died in 1892. He was succeeded, not without a new schism, by his son Abbas Effendi, called Abdul Baha ('servant of the splendour'), who was born in 1844, on the day on which his father first made known his claim that he was 'He whom God shall make manifest.' He shared the imprisonment of the community at Acre until the revolution of 1908. Thereafter he lived in Acre and in Haifa, and made many missionary journeys in Europe and America, was knighted (1920), and died in 1921. Baha developed the system, which has Pantheistic and Gnostic elements, is essentially anti-priestly, and seeks to comprise the essence of all true religions. Revelation is held to be not final, but progressive. Universal peace, toleration, and friendship are essential principles. Bahaism enjoins few prayers, and those only on fixed occasions; encourages hospitality and charity; prohibits polygamy, concubinage, and divorce; discourages asceticism and mendicancy; and directs women to discard the veil, and share as equals in the intercourse of social life. It is maintained that a fifth of the population of Persia are Bâbîs or Bahais, and they are found in Egypt, Algeria, Morocco, and northern India, converts having been made from Sunnis as well as Shiahs, from Hindus and Sikhs; in Ceylon, China, and even Japan, from Buddhists; and many adherents are to be found in Europe and, especially, in the United States. Their total numbers are computed by millions. See books by E. G. Browne (1891–1918), M. H. Phelps (1914), Eric Hammond (1909), and T. K. Cheyne (1914); also SUFISM, and Malcolm's *Five Years in Persia* (1905).

Babington, ANTONY, was born of an old Catholic family at Dethick, Derbyshire, in 1561. Young, handsome, rich, left an orphan at ten years of age, he had served for a short time as page to Queen Mary of Scotland, then a prisoner at Sheffield, when in 1586, some seven years after his marriage, he was induced by Ballard and other Catholic emissaries to put himself at the head of a conspiracy that had for its object Elizabeth's murder and Mary's release. Babington reserved the deliverance of Mary for his own share, entered into correspondence with her, and received from her letters approving of the assassination. The

plot was betrayed, and after hiding in the depths of St John's Wood and at Harrow, he was taken, and with thirteen others condemned to die. His prayers for mercy, his explanation of the cipher letters, were all in vain, and on 20th September 1586 he followed Ballard to the scaffold.

Babington, CHURCHILL, an archæologist and classical scholar of wide and varied learning, was born at Roecliffe, Leicestershire, in 1821. He studied at St John's College, Cambridge, was professor of Archæology in that university (1865–80), and rector of Cockfield, Suffolk, from 1866. Besides editing the newly discovered fragments of Hypereides, he wrote on botany, ornithology, archæology, and edited Higden and Pecock. He died in 1889.—CHARLES CARDALE BABINGTON (1808–95), field botanist, archæologist, professor of Botany at Cambridge, was his cousin.

Babiroussa (*Sus babirusa*), a species of hog, according to some a distinct genus, inhabiting marshy forests in Celebes and some of the smaller islands of the Eastern Archipelago. The canine

Fig. 1.—Babiroussa (*Sus babirusa*).

teeth in the male are very large, the upper ones being curved towards the top of the head, and so like horns at first sight that the animal is often called the horned or deer hog. It is a nimbler animal than the common hog, and has much more slender legs. It swims well and frequently, is fond of eating maize, and is often killed for the sake of its flesh. It is of interest, however, mainly on account of the extraordinary development of the canines in the male. The teeth, like those of rodents (see TEETH), grow from persistent pulps, and thus admit of that extension which doubtless occurred at first as an abnormal variation, but has now become a constant character in the males. In the wild boar (fig. 2), wart-hog, &c., the upper canines, even in the female in some instances, tend similarly to curve upwards. This variation, rendered possible by the persistent pulp, and by a slight mobility of the teeth in their sockets, seems largely due to some slight displacement preventing the upper and lower canines from meeting and limiting one another as they ought normally to do. The frequent habit of rubbing the snout and teeth against hard objects would readily account for an initial displacement. What occurs to a slight extent and occasionally in certain hogs, as the result of slight divergence, bringing about failure of apposition, and thus permitting overgrowth, is present in the male babiroussa as a constant and exaggerated feature. The peculiarity is either transmitted by inheritance, or reappears in every male in response to the constant re-occurrence of the same conditions. In specimens kept in captivity the variation has been known to become even more exaggerated. Mr Sutton discusses this interesting development in his *General Pathology* (1886), and notes a case from the Zoological Gardens in London where the upper canines of a babiroussa, which was fond of rubbing its tusks, exhibited a

Fig. 2.—Tooth of Wild Boar.

Fig. 3.—Skull of Babiroussa (from Sutton).

very marked circular development, and would have penetrated the skull had they not been repeatedly cut (fig. 3). Though it is unreasonable to expect to find a use for every variation, it cannot be doubted that these exaggerated canines are of use to the males in fighting for the females, and are to some extent at least an outcome of the general characteristics of the sex. See SEX.

Baboo. See BABU.

Baboon, or CYNOCEPHALUS (i.e. 'dog-headed'), or PAPIO, a genus of Old-World monkeys, with numerous species such as mandrill, drill, sphinx, chacma, and hamadryas. They are at home in Africa, but spread into adjacent parts of Asia. Their most striking characters are the plump form, the prominent snout, the large canine teeth, the capacious cheek-pouches, the ugly callous cushions on which they sit, and the frequent shortness of tail.

Animals so abundant, ferocious, and repulsively ugly as the baboons could not escape the observation of the ancients. Aristotle was impressed by the pig-like muzzle of the mandrill, to which he gave the expressive name of *Chœropithecus*, or hog-ape, and even the comparative indifference of the next eighteen centuries to zoological facts was repeatedly interrupted by the hideous vision of some baboon. But long before Aristotle, the baboon had been an object of veneration in Egypt, and was especially sacred to, and typical of, Thoth, the lord of letters. Egyptian monuments are thus frequently adorned with statues and figures of baboons, and their mummies are still occasionally found. They held a less honourable place in the middle ages as curious pets in any completely equipped fashionable establishment. Nor is it so long since the mandrill, Jerry of the Surrey Gardens, used to be brought to amuse George IV. They are mischievous and voracious animals, and often commit devastations on plantations and other property.

Distribution.—Fossil remains seem to show that the baboons had once a much wider distribution than the now living species. They have, however, kept their footing well, being widely distributed throughout Africa. The drill and mandrill frequent the west coast (Guinea); the baboon proper inhabits wilder and more inland regions from Abyssinia and Kordofan inwards; the chacma and sphinx have rocky homes in the south and west respectively; the hamadryas has its seat among

the coast mountains of Abyssinia, south Nubia, and western Arabia. The geladas of the Abyssinian highlands are usually referred to a separate genus, Theropithecus. The small black baboon of Celebes is also regarded as representing a separate genus, Cynopithecus.

Structure.—The dog-shaped head, with its long muzzle and almost constantly terminal nostrils; the capacious cheek-pouches, in which a superfluity of food can be temporarily stowed away; and the frequently large and brightly coloured callous cushions on their hips, are the most prominent external characters. There is an interesting but quite superficial resemblance or convergence to Carnivores, especially well marked in the mandrill.

Habit.—The baboons are quadrupeds, running swiftly on all fours, climbing with great vigour, fond of sitting on their haunch-pads, and especially at home in mountainous districts. Many of them live in herds, and are therefore formidable both to animals and property. The troops are led by patriarchs and guarded by sentinels. They fight with rival herds, and have to withstand the attacks of leopards and other carnivores. Playful and amiable when young, the older forms, and especially the males, are notorious for their evil dispositions, and allow their passions to run riot. The *facile princeps* in iniquity is the mandrill. Those brought home to zoological gardens become specially malicious, the result in part of their sensitiveness to cold, and of the irritations of visitors. They are all clever, dexterous animals, with well-developed brains. Their food varies greatly—fruits, roots, seeds, insects, worms, and many other commodities. The anubis baboon lives principally on the stem and roots of the unique welwitschia, so remarkable for its persistent cotyledons, which act as substitutes for the undeveloped foliage leaves.

Different Species.—About a dozen different forms are known. The Baboon proper (*Papio babuin* or *cynocephalus*) is hardly known except in captivity. It is relatively small, with a yellowish-brown hide, long depressed skull, and uncoloured cheeks. It is equally strong and clever, and is often utilised by Arabian and Egyptian conjurers. A near relative is the Sphinx (*P. sphinx*), with only a stump of a tail. The Pig-tailed or Chacma Baboon (*P. porcarius*) occurs in troops in South Africa. Its fur and

Sacred Baboon (*Papio hamadryas*).

medium-sized tail are almost black; the muzzle is very long; the colour of the naked parts of the skin is violet-blue; the ridges above the eyes are very prominent, and the eye-sockets are curiously separated by an upright ridge of bone; the upper canine teeth are extraordinarily long. The Sacred Baboon (*P. hamadryas*), frequenting the Abyssinian highlands, stands about 4 feet high, is of a light-gray and dusky-brown colour, with a naked flesh-coloured face and a much-compressed ugly skull. Formerly sacred to Thoth, and typical of learning, the hamadryads have sunk in modern Egypt to a subordinate position as luxurious curiosities. They are sometimes caught by being intoxicated with liquor purposely exposed near their haunts, fondness for stimulants being one of their often observed vices. Their bold plundering habits not infrequently lead them into collision with natives and travellers. The Anubis Baboon (*P. anubis*), with various subspecies, ranges from Egypt all through tropical Africa. It often does much damage by descending

The Mandrill (*Papio maimon*).

for midnight ravages among the Indian corn plantations. It was tamed by the ancient Egyptians. The Mandrill (*P. maimon* or *mormon*), with its short tail-stump, its enormous, brightly coloured cheek-swellings, its brushed crown of hair, pig-like snout, 'beetled' brows, sunken eyes, immense canines, and decorated posteriors, is well known as a voracious and passionate animal. The colours and other striking features are in part secondary sex-characters, being more marked in the males, and apparently attractive to the less brightly coloured females. The Drill (*P. leucophæus*) is a smaller form, with less striking colouring and ugliness; it frequents rocks and plains on the Guinea coast. A good account of baboons is given by Professor Martin Duncan in Cassell's *Natural History*, vol. i. See H. O. Forbes, *Handbook of the Primates;* and MONKEYS.

Ba'brius, a Greek fabulist, of whom nothing is known, his very date having been put variously from the Alexandrian age to the middle of the 3d century of our era, though the latter is disproved by a 2d century papyrus fragment. He made a considerable collection of Æsopic fables (see ÆSOP), which he turned into choliambic verse, in a natural and popular style. Several prose versions and transformations of these were made during the middle ages, and have come down to us under the name of *Æsop's Fables.* Bentley was the first to recognise in these so-called prose fables of Æsop traces of versification showing the original work of Babrius. A few fables were added from manuscripts by Furia, Korais, and Schneider, and all that was known at the time was collected by Knoche (Halle, 1835). At last, in 1842, a Greek of the name of Minoides Minas, employed by the French government to explore the convents of the East, discovered at Mount Athos a manuscript with 123 hitherto unknown fables of Babrius,

a copy of which he made and brought to Paris, where they were published in 1844. In 1857 he found 95 fables more, the authenticity of which, however, was denied by Conington, Cobet, and other scholars; these, though included by Bergk in his *Anthologia Græca*, are now almost universally recognised as forgeries. Knöll discovered a number of new fables in the Vatican library in 1877, and Assendelft others at Palmyra in 1891.

See the editions by Lachmann (1845), Rutherford (1883), and Crusius (Leipzig, 1897); the translation by Davies (1860); a Latin dissertation by Christofferson (1901); and the article FABLE, with other articles there cited.

Babu, or BABOO (Hindi, *Bābū*), properly a term of respect, like Master or Mr, in this sense now used only in Lower Bengal. Anglo-Indians often understand it as meaning a superficially cultivated Bengali; and it often means neither more nor less than 'a native clerk who writes English.' English so written, more copious than correct, and delighting in long and learned words often most ingeniously misapplied, is known as Baboo-English. See BABA.

Baby. For the law as to children, the feeding of infants, &c., see INFANT, INFANTICIDE.—BABY-FARMING is an opprobrious name invented for the taking in of children to be nursed for payment, with the implication that much more regard is had to the convenience of the parents and the pecuniary advantage of the receiver than to the well-being of the infants. In 1871 the scandals connected with the 'farming' of babies for one sum paid down, no further charge being taken by the parents and no further questions asked, led to the suspicion that, especially in the case of illegitimate children, an early death was desired, or perhaps directly brought about. That shameful neglect was common, and proper nursing very rare, was made evident; and that actual murder was not very rare was proved in several trials. The mortality among such children was appalling. A select committee of the House of Commons made a very strong report in this sense in 1871; and an act of parliament in 1872 insisted on registration and licenses for houses where children were taken in, made strict regulations, and allotted punishment of offences up to six months' imprisonment with hard labour. A committee of the House of Lords in 1896 to inquire into the working of the act led to its repeal and the enactment of the Infant Life Protection Act of 1897; which again was amended and superseded by the Children Act of 1908. Most of the United States deal stringently with baby-farming.

Babylon, the great city on the Euphrates, was the chief town of Babylonia (q.v.).—Babylon was also the name of a fortress in Lower Egypt, on the right bank of the Nile, opposite the pyramids of Gizeh, and so in what was afterwards Old Cairo (q.v.). Its origin was ascribed to Babylonian deserters, but it first became an important place under the Romans.—'Babylon' in the Book of Revelation, which was to be punished for its sins, and specially its persecutions, is generally identified with Rome. The 'Babylon' of 1 Peter was probably Rome, though possibly Babylon on the Euphrates.

Babylon, a village in Suffolk county, New York, on Great South Bay, and 37 miles E. of New York city, is a summer resort; pop. 2500.

Babylonia (*Babilu* in the Assyrian inscriptions, *Babirush* in the Persian) was the name given to the low alluvial plain watered by the lower streams of the Tigris and Euphrates, now forming the modern Arab province of Irak-Arabi. In the Old Testament it bears the various names of *Kasdim*, 'the land of the Chaldees,' Shinar, and Babel. Its northern boundary, starting from the region of Naharaim or Mesopotamia, was formed partly by the Euphrates and its tributaries, but chiefly by a line of forts and frontier stations established by mutual arrangement between the Assyrian and Babylonian kings at various periods, this being probably the Median Wall of the classical writers. On the east the Tigris formed the natural boundary, but some portions east of that river and south of the Lower Zab at times were included in the Chaldean empire. The western boundary was the Euphrates, or rather the desert to the west of that stream, for from the earliest period the fertile fringe of land along the river's bank in the neighbourhood of Ur (Mugheir) and Borsippa (*Birs-i-Nimrud*) was under Babylonian rule. The southern limit was the shore of the Persian Gulf, the waters of which then extended considerably farther inland, the two rivers as late as the time of Sennacherib, 705 B.C., entering the sea by separate mouths. The country has from all time been one of the most fertile spots in the whole of Western Asia, and famed for its rich corn-producing qualities. Indeed, Herodotus says that it supplied one-third of the corn produced by the whole Persian empire. The inscriptions afford ample confirmation of this fact, the tithe receipts of the temples showing an enormous yield of cereals. This natural fertility was greatly aided by the splendid system of artificial irrigation through a network of canals spread all over the country, many of which are navigable to the present day. The most important of these was the Nahr Malka, which was serviceable as late as the 7th century A.D., and only disused when allowed to fall into decay after the Mohammedan conquest. This important artery joined the Tigris and Euphrates in North Babylonia, passing through the ancient cities of Sippara or Sepharvaim and Akkad, and entering the Tigris about 30 miles below Bagdad. The lines of its course are marked by the modern Yusifieh and Amran canals. This canal was probably excavated by Khammu-rabi in the 21st century B.C. Other important inland waterways were the Nar Kuti or river of Kutha, the modern Habl-es-Sook, which passed through almost the whole length of Central Babylonia; and the Naru Essu or new river, a large canal in the neighbourhood of Babylon excavated by order of Nebuchadrezzar II. (605 B.C.). At an early date Babylonia was divided into Akkad or Northern Babylonia, and Sumer, usually identified with the biblical Shinar, or Southern Babylonia. Akkad, which took its name from the city of Akkad, near Sippara, was the first to be occupied by the Semites and to be the seat of a Semitic kingdom; Sumer, on the other hand, long remained in the possession of the older Sumerian population, and continued to the last to be less Semitic than its northern neighbour. Among its cities were Erech (an early Semitic capital), Kis, Sippara ('the city of the sun-god,' now *Abu Habba*), Opis, Babylon, and Nippur. Lagas, Larsa, Eridu, the ancient seaport of the country, and Ur (on the western side of the Euphrates) were in Sumer. In the Kassite period Northern Babylonia was known as Kar-Duniyas, 'the Wall of the god Duniyas.' In contradistinction to the desert, the Babylonian plain was called by the Sumerians Edina, 'the land of Eden' of the Old Testament. The marsh-lands in the south, 'the land of the sea,' through which the great 'salt river' passed, and which bordered on the Persian Gulf, were inhabited by Aramæan tribes called Kaldâ or Chaldeans by the Assyrians.

The summer climate is exceedingly hot, and rain prevails from December to January. The natural products of the land were almost unbounded—corn and many other cereals, sesame, cucumbers, melons, vines, and, above all, the date-palm, which afforded wood, fibre for ropes, fruit, and wine. Stone and minerals are practically unknown; hence Babylonia

was the home of brick architecture, the bricks being baked in the sun. Asphalt was used as mortar, and the houses were roofed with reeds.

Lions, panthers, jackals, and wild boars were numerous; oxen, sheep, and goats were still more so. Large flocks of sheep were tended in the desert by the Bedouins for their Babylonian masters, and the wool yielded by them was one of the chief articles of Babylonian trade. The dog was domesticated; so also was the ass; the horse and camel were later introductions, the horse not making its appearance before the age of Khammu-rabi.

Ethnology.—Babylonia, according to both sacred and classical writers, has always been a land of mixed races and languages, and its polyglot and heterogeneous character is shown by the monuments to have existed from remote antiquity. The inscriptions have revealed the fact that its earliest inhabitants, who drained the marshes, trained the rivers, built the cities, and invented the cuneiform system of writing, spoke an agglutinative language—that is to say, a language of the same type as those of the Turks or Finns. The sculptures show them to have been beardless and round-faced, with high cheek-bones, the physical type being like that of the primitive non-Semitic population of Elam. The original home of the Sumerians, as they are now called, is a matter of dispute. The Semites entered the country at an early date, and established themselves in Northern Babylonia or Akkad, where the first Semitic empire—that of Sargon—arose; the inhabitants of Sumer or Southern Babylonia retained their non-Semitic characteristics to the last. The marsh-lands, south of Sumer, however, were occupied by Aramæan tribes of Semitic descent, the Chaldeans of the classical writers. About 1700 B.C. non-Semitic mountaineers from the East, known as the Kassi or Kossæans, conquered Babylonia, and introduced a new racial element into the country; while in later times Kurds, proto-Armenians, and Hittites, as well as Elamites, were to be found there. The Semites, having once obtained a footing in Babylonia, adopted and adapted the more advanced culture of their Sumerian masters. They borrowed the cuneiform writing, the religion, mythology, and much of the science of that inventive people, and so rapidly increased in numbers and power that as early as about 3800 B.C. we find a dynasty of Semitic kings, under Sargon of Akkad and his son Naram-Sin, ruling in North Babylonia.

Chronology.—For Babylonian chronology we have to depend in the first instance on notices in the Old Testament, the quotations in Josephus, Eusebius, and Africanus from the lost history of Berossus, a Chaldean priest who wrote in Greek about 270 B.C., and, above all, the list of Babylonian kings from Nabonassar (747 B.C.) appended to the tables of the eclipses of the sun and moon compiled by Claudius Ptolemæus in the 2d century A.D. The list of dynasties which George Syncellus professes to have extracted from Berossus is of uncertain authority. The native tablets have given us dynastic lists of kings with the duration of their reigns, a series of chronicles, a 'synchronous' history of Babylonia and Assyria, references in later texts to earlier events, and multitudes of dated legal and commercial tablets beginning about 2500 B.C., and coming down to the Parthian era. The years were named after the chief event or events which characterised them, among which the death or accession of a king was necessarily the most important; and the fact that Babylonia was a commercial community made a system of accurate dating indispensable.

Domestic and Social Life.—The recovery from the libraries of Babylonia of many thousands of inscribed tablets relating to almost every phase of private daily life affords us an insight into the sociology of this ancient empire far more clear than that provided by the records of any other primitive kingdom, excepting perhaps the sister-kingdom of Egypt. The child, immediately after birth, was sealed with the sign of sonship, which was confirmed by witnesses; adoption was very frequent. On reaching the age of puberty, the youth was admitted to his portion as a free-born citizen, and his freedom attested to him. The Babylonian legal tablets relating to the laws of marriage do not confirm the statements of Herodotus. The dowry of the woman was secured to her, and was returnable in case of divorce, while marriage was attended by both a religious and civil ceremony. Women, especially married women, occupied an exceptionally favourable position in Babylonia. Offences against the mother were punishable by mutilation and deprivation of civic rights. Women could trade and own slaves and other property in their own right. Like the men, they were educated and taught tablet-writing. Slaves were protected from cruel treatment, and if injured, had to be supported by their masters. They could own land, and, if able, maintain themselves. Slaves were often apprenticed to learn trades by their masters.

The laws were administered by regular appointed judges, who sat either in the gates of the temple or in the great gate of the city. The supreme judges were called 'the judges of the king.' The decisions were all governed by certain precedents, many of great antiquity, which were drawn up and carefully preserved. The chief punishments were fines, imprisonment, deprivation of civic rights, and in some cases death; and the right of appeal to the king could be claimed. About 2000 B.C. the laws of the country were all codified by Khammu-rabi or Amraphel, and a copy of the Code (q.v.), the oldest in existence, has come down to us. The revenues were derived from a fixed tariff of taxes. The chief taxes were the 'king's tax,' apparently a tithe on all property, the army tax, and the dues levied on certain districts for ships. The local taxes were the temple tithes, called tenths (*esritum*), the first-fruit tax, the corn and date and sheep tax, and the road and canal dues. Numerous documents relating to these dues are now in the British Museum collection. The temples had rich estates attached to them like the modern Arab Wakf lands, which were farmed or leased. The transfer of land was regulated by fixed laws, and leases had in many cases carefully drawn plans of the estates attached to them. The standard currency was a silver one, the units being the talent, maneh, shekel, and parsi. Coined money was probably introduced in the reign of Darius.

Law and the Code of Khammu-rabi.—Babylonia was from the earliest times a great commercial community, and law therefore soon attained a great development in it. Like English law, it was 'case-made;' that is to say, it consisted of the decisions pronounced by the judges in individual cases. These decisions were founded upon precedents, and were given after witnesses had been sworn and heard upon both sides, and were then duly registered by the official clerks. Women as well as men could act both as witnesses and as parties to a suit. The earliest laws were necessarily in Sumerian, and Sumerian long continued to be the language of the courts, like Norman-French in England. Gradually Semitic Babylonian took the place of Sumerian, though many of the technical words and phrases remained Sumerian. From time to time certain groups of laws were codified, but it was not until the reign of Khammu-rabi that a code embodying the whole of Babylonian law

was compiled. It was one of the first results of the king's unification of Babylonia and its empire, and of an attempt to weld together the various races in it. Copies of the code were sent to different parts of the empire; one of these was discovered by M. de Morgan at Susa in 1902, and is now in the Louvre. The civil wars that had recently devastated Babylonia had led to a large amount of brigandage: hence the Draconian character of much of the legislation. The distinguishing feature of the legislation, however, is its consideration for the rights of property, property being regarded as of more value than the life of the individual. This care for the rights of property, natural in a trading community, offers a marked contrast to the provisions of the Mosaic Law, which was made for a body of nomads. The individual is forbidden to take the law into his own hands, the right of blood-revenge not being recognised except in two instances, when a brigand is caught red-handed, or when a man is found robbing the house of a neighbour which has been set on fire. In this, again, we have a contrast to the Mosaic Law. Another characteristic of the code are the laws relating to inheritance. The father (or even mother) could make a will, and leave property to a 'favourite son' over and above what legally came to him after his father's death. Children, moreover, could be adopted, and a slave who was thus adopted obtained all the rights of the free man. Of this there is no trace in the Mosaic Law. The Book of Genesis, however, contains references to usages which show that in the patriarchal age the Babylonian Code was observed in Canaan as in other parts of the Babylonian empire. The conduct of Sarah and Abraham towards Hagar and her son is explained by the laws that the wife could present her husband with a concubine, and if she had had no children the husband could take a second and inferior wife, while the mistress is forbidden to sell the concubine if 'she has a dispute with her mistress because she (i.e. the concubine) has borne a child to the husband.' The adoption of Eliezer by Abraham was similarly in accordance with the Babylonian law; so, too, was the purchase of the field and cave of Machpelah with Babylonian shekels (*sikli*), and the threat of Judah that he would punish his daughter-in-law, whom he supposed to be a widow, with death by burning. This was the punishment enacted against a nun who was unfaithful to her vows of virginity or widowhood.

The code is a purely civil one. Beyond the fact that all legislation was believed to have been inspired by the sun-god, there is no allusion to religious sanctions. Owing to its 'case-made' origin, the individual laws begin with the formula 'If.' It is the same with the civil laws of the Mosaic Code (Exodus xxi., xxii.), which had a similar 'case-made' origin (Exodus xviii. 25, 26). Some of these resemble the enactments of the Babylonian Code. Thus the Code of Khammurabi lays down that a man who has been enslaved for debt should regain his freedom after three years, that a fine should be inflicted for pasturing cattle in another man's field, that the defaulter who had betrayed his trust should pay back double, that the owner of cattle which had been lost or stolen through neglect could claim restitution, and that the receiver of bribes should be severely punished.

Among other regulations of the code are some relating to taverns and their keepers, and to surgeons and veterinaries. 'If a surgeon performs a serious operation on a man with a bronze lancet and the man recovers from a tumour or a disease of the eye, the surgeon shall receive ten shekels of silver. If the operation has been performed on a poor man, he shall receive five shekels of silver. If the operation has been performed upon a slave, the slave's master shall pay two shekels of silver. But if after the operation the man dies through cutting open the tumour or the destruction of the eye, the surgeon's hands shall be cut off. . . . If a veterinary has performed an operation on an ox or ass and has cured it, the owner shall pay him the sixth part of a shekel. If the animal dies, he must pay the owner a fourth part of its value.'

Art and Manufactures.—Babylonian art was until recently represented by a few engraved cylinders and gems; but the excavations at Tello, Abu-Habba, and elsewhere have now brought to light statues which are really good works of art,

Fig. 1. Chaldean Cylinder, Marble or Porphyry (New York Museum).

and differ from the later works of the Assyrian artists. One of the largest of these statues is nearly life-size, and represents the 'high-priest' Gudea, the viceroy of Lagas, seated on his throne; the statue is extremely accurate in its anatomy, and carved in the hardest green diorite. The whole of the group is covered with a long inscription in archaic characters, recording the restoration of various temples by this prince about 2500 B.C. Still more remarkable is a fine head carved in red porphyry, which clearly bears the appearance of being a portrait, and is true to the facial characteristics of the Sumerian race. The execution of these works of art indicates that the art of sculpture had been long practised, and that tools of the most perfect temper must have been used. Along with the stone statues were found several bronze statuettes showing a knowledge of the art of casting metals. Gem-engraving had always been a special feature of Babylonian art, and numerous hard stone seals have been found, the intaglio workmanship of which shows a high development of the lapidary's art. The subjects upon these are taken from the legend of Gilgames, or from other popular myths; others, again, relate to the future life. Talismanic gems bearing emblems of the gods and magical formulæ are also frequently found. The stones chiefly selected by the Babylonian lapidaries were hæmatite, green and red jasper, cornelian, chalcedony, crystal, lapis-lazuli, onyx, and sardonyx. Music formed an important feature both in the court and religious ceremonies of the Babylonians at an early period, and on the sculptures we find harp, pipe, and cymbals represented. Among the trades mentioned in the tablets are those of weaver, dyer, potter, smith, builder, and carpenter.

The classic writers also represent the civilisation of the ancient Babylonians as of a high stamp. Arts and commerce were highly flourishing—the last was carried on by caravans with Bactria, Persia, and Media, perhaps as far as India, and by shipping on the Persian Gulf with Arabia. Babylonia was famous for its dyes, its cloths, and embroideries, especially for the manufacture of rich carpets with inwoven figures of strange animals and arabesques, such as we yet see in the Nineveh sculp-

tures. The general prosperity was such that Babylonia and Assyria together were able to pay to Persia, under Darius Hystaspis, a yearly tribute of 1000 talents (upwards of £280,000)—a sum greater than that contributed by any other province.

History.—The French excavations at Tello, the ancient Lagas, and those of the Americans at Niffer, the ancient Nippur, have enabled us to reconstruct the outlines of early Babylonian history. It begins with a number of small independent states—all of them Sumerian, and for the most part mutually hostile. At an early date, however, the Semites entered the country, and, after adopting the culture and script of the Sumerians, established principalities of their own. Among these were the kingdoms of Kis and Erech. Whether a certain king of Erech, however, whose name has been read Lugal-zag-gi-si, and who founded the first Babylonian empire, is to be accounted a Semite is doubtful. He was more probably of Sumerian origin. Ur (q.v.), Larsa, and Nippur were included in his kingdom, and he claims to have extended his rule from the Mediterranean to the Persian Gulf. The excavations of the Frenchmen De Sarzec and Cros have made us better acquainted with the history of another Babylonian city, Lagas (*Tello*); but the authority of the early Sumerian kings of Tello was limited to Southern Babylonia. It was otherwise with the Semitic dynasty of Sargon of Akkad and his son Naram-Sin, whose date is fixed by the royal antiquarian Nabonidos at 3800 B.C. They not only established their power over all Babylonia, but created an empire which stretched from Susa on the east to the Mediterranean on the west. Three campaigns were needed before 'the land of the Amorites'—i.e. Syria and Palestine—could be subdued and welded with Mesopotamia, Babylonia, and Elam into 'a single' empire. Naram-Sin added Magan, the Sinaitic peninsula, to his father's conquests; there is a portrait of him on a monument discovered at Diarbekr.

Fig. 2. Inscription upon the Sargon Seal.

The empire of Sargon and Naram-Sin soon broke up, and was followed by a long period of inaction, during which we must place the reign of the Semitic king Manistusu, an important monument of whom, throwing light on the economical condition of Babylonia, has been disinterred at Susa. Eventually a Sumerian dynasty arose at Ur, which united Babylonia under one rule, planted colonies in Cappadocia, and carried on campaigns in the Lebanon. Its first kings, Ur-Gur and Dungi, were great builders. One of their viceroys was Gudea, the high-priest of Lagas, of whom we possess many inscriptions. Cedar was brought for his buildings from the Gulf of Antioch, stone from Lebanon, copper from Sinai, gold from Northern Arabia. The last king of the dynasty of Ur perished in battle against Elamite rebels, and civil wars, followed by foreign invasion, devastated Babylonia. Eventually Northern Babylonia was conquered by the Amorite, Samu-abi ('Shem is my father'), while Southern Babylonia fell into the hands of the Elamites, who made Larsa their capital, Babylon taking the same position in Northern Babylonia. The fifth king of the Amorite dynasty seems to have been overthrown by the Elamites; Babylon was captured by its Elamite foes; and his son, Khammu-rabi or Ammurapi, the Amraphel of Genesis xiv., who was a mere boy, was placed on the throne as the vassal of the Elamite king (about 2000 B.C.). After thirty years of subjection, Khammu-rabi recovered his independence; the Elamites were defeated in battle; and Larsa, the capital of their representative, Eri-Aku or Arioch, in Southern Babylonia, was taken by storm. Khammu-rabi was now sole master of Babylonia and its empire, which included Syria and Palestine, and he proceeded to clear the country of brigandage and to compile an elaborate code of laws. Canals were dug or reopened, and the temples and cities of Babylonia were restored.

Samsu-satana, the fifth successor of Khammu-rabi, was the last king of the dynasty. Its fall was probably occasioned by an invasion of Babylonia by the Hittites. For a time the Aramæans from the coast-lands of the Persian Gulf governed Babylon; then came an invasion of wild Kassites, under Gandis, from the eastern mountains, and for 576½ years Babylonia was ruled by a Kassite dynasty. In course of time the invaders adopted the culture and language of Babylonia; but the empire in the west was lost, never to be regained, while Assyria became an independent kingdom. About 1400 B.C. we find the kings Kadasman-khardas and Burna-buryas II. engaged in correspondence with the Pharaohs of Egypt. Meanwhile there was frequent war with Assyria, which lost no opportunity of interfering in Babylonian affairs; and eventually Babylon was captured by the Assyrian king Tukulti-Ninip, its king, Kastilias, was slain, and for seven years Babylonia was ruled by an Assyrian sovereign. Then the Babylonians recovered their independence, and eight more Kassite princes sat on the Babylonian throne. The last of them was overthrown by the Elamites about 1180 B.C., and a dynasty of native Babylonian kings followed. The most famous of these was Nebuchadrezzar I., who has left us a graphic account of his invasion of Elam and Kurdistan. Towards the end of his reign, however, he suffered defeat at the hands of the Assyrians. The dynasties which followed were short-lived; and then came another native line of kings (about 1000 B.C.), the first of whom, Nabu-mukinpal, reigned thirty-six years. One of his successors, Nabu-nazir (747–734 B.C.), is the Nabonassar of classical writers, with whom the Ptolemaic canon begins. Five years after his death Babylonia was conquered by the Assyrian king Tiglath-pileser IV., who, under his original name of Pulu or Pul, was crowned at Babylon 729 B.C. This conquest of Babylonia was very important, as it once more unified the two kingdoms on the banks of the Tigris and Euphrates. When the Assyrian throne was seized by Sargon in 722 B.C., after the death of Shalmaneser IV. (known as Ululâ in Babylonia), the Babylonians revolted, and under Merodach-

Fig. 3. King Merodach-nadin-akhi. (From a Basalt Stele in the British Museum, about the 12th century B.C.)

baladan, the Chaldean from the marsh-lands of the Persian Gulf, maintained their independence for twelve years. In 710 B.C., however, Merodach-baladan was crushed, in spite of his alliance with Hezekiah and other western princes, and Babylon again became Assyrian. After the assassination of Sargon in 705 B.C. Merodach-baladan returned, but after a reign of nine months was driven out by Sennacherib and forced to find a refuge in the Elamite provinces on the eastern shore of the Persian Gulf. For some years Babylonia was governed by Assyrian viceroys or by native princes who had Elamite support; the battle of Khalulê, however, in 691 B.C., broke up the resistance to Assyria, and two years later Babylon was taken and razed to the ground. It was rebuilt by Esar-haddon, on whose death in 668 B.C. Samas-sum-yukin, the twin-brother of Assur-bani-pal, called Saosduchinos by the Greeks, was appointed viceroy. He headed the great revolt against Assyria, which ended in the devastation of Babylonia and the capture of Babylon, where Samas-sum-yukin burned himself in his palace in 648 B.C. The next Babylonian viceroy, Kandalanu, died in 625 B.C., and was succeeded by Nabu-pal-uzur (Nabopolassar), who, with the assistance of Cyaxares of Ecbatana, revolted from Assyria and made himself independent king of Babylonia, 606 B.C. He died two years later, while his son, Nebuchadrezzar II. (Nabu-kudur-uzur) was engaged in driving the Egyptians from Syria and Palestine. (In *Nebuchadnezzar* in 2 Kings xxiv., xxv., &c., *n* is a text-corruption. See Jer. xxxix.)

Nebuchadrezzar II. was one of the greatest of the Babylonian sovereigns. During his long reign of forty-three years he restored the ancient Babylonian empire in the west, rebuilt Babylon, and covered Babylonia with temples, fortifications, and canals. In 599 B.C. he took Jerusalem, sending Jehoiakim captive to Babylon; and eleven years later (588 B.C.) he destroyed the city with its temple, and removed most of the inhabitants to Chaldea. In 568 B.C. he made a successful campaign in the Egyptian Delta. In 561 B.C. he was succeeded by his son Evil-Merodach, who released Jehoiakim, but was murdered (in 559 B.C.) by his brother-in-law Nergal-sharezer or Neriglissor, the Rab-Mag (probably the Rab-mugi of the Babylonian texts). His reign lasted till 556 B.C., his son, Labasi-Marduk or Laborosoarchod, only ruling a few months, when the throne was usurped by a nominee of the Babylonian priests, Nabonidos (Nabu-naid). Nabonidos was an antiquarian rather than an administrator, the command of the army and the active government of the country being handed over to his son, Bil-sar-uzur, the Belshazzar of the Book of Daniel. He restored the great temple of the moon-god at Harran in Mesopotamia which had been destroyed by the 'Manda' of Ecbatana, as well as the ancient temples of Sippara, Larsa, and Ur, excavations being undertaken to discover the original records of their construction and to trace their history. In his sixth year, 549 B.C., came the overthrow of Astyages (Istuvegu) of Ecbatana by Cyrus (Kuras), king of Anzan in Elam. Later on in his reign his attempts to centralise the religious worship of the country at Babylon led to the growth of a disaffected party; the members of this party intrigued with Cyrus, who meanwhile had become king of Persia. In 539 B.C. the coast-land revolted, and Cyrus invaded Babylonia from the north. The Babylonian army was defeated at Opis, and a few days later, on the 14th Tammuz (June), Sippara was taken without fighting. Nabonidos fled and concealed himself in Babylon, followed by Gobryas, the governor of Kurdistan, with the army of Cyrus. On the 16th Gobryas entered Babylon without resistance, and Nabonidos was captured. The daily services went on as usual in the temples, and the contract-tablets show that there was no disturbance of trade. On the 3d of Marchesvan (October) Cyrus came to Babylon and proclaimed a general amnesty, Gobryas being appointed governor of the city. The foreign exiles in Babylonia were allowed to return to their native lands, taking with them the images and sacred vessels of their gods. After the death of Cambyses (521 B.C.) Babylon revolted under Nidinti-Bel, who claimed to be Nebuchadrezzar, son of Nabonidos. Three years were needed before the rebel city could be taken by the Persian army of Darius Hystaspis. In 513 B.C. it revolted again under a certain Arakha, but this second revolt was soon suppressed.

With the overthrow of the Persian monarchy, Babylonia came under the short-lived dominion of Alexander the Great, who died in that city (323 B.C.). Seleucus I., to whom it had been promised at the conference of Triparadisus, contested and won the possession of it from Antigonus (312 B.C.). About 140 B.C. it was taken from the Syrian monarchs by the Parthians. It came into the hands of the Romans only temporarily, first under Trajan (114 A.D.), under Septimius Severus (199 A.D.), and again, under Julian (363 A.D.). When in 650 the successors of Mohammed put an end to the new Persian monarchy of the Sassanids, the province of Babylonia, where Bagdad was built (762–766), became the seat of the khalifs till 1258. From 1638, when the Turks, for the second time, took it from the Persians, till the Great War, it was under the dominion of Turkey, divided into the pashalics of Bagdad and Basra. See MESOPOTAMIA.

Language and Literature.—The language of the Sumerians was agglutinative like that of the Turks. The script was originally pictorial; when, however, clay was introduced as the writing material it passed into the cursive form known as cuneiform or 'wedge-shaped,' and many of the ideographs or pictures of ideas became purely phonetic (see the article CUNEIFORM; also WRITING). After the occupation of Northern Babylonia by the Semites and the adoption by them of the Sumerian culture and script, the phonetic character of the script was largely developed, the Sumerian words expressive of ideas becoming mere phonetic symbols. The older Sumerian literature was now translated into Semitic Babylonian or provided with Semitic translations; and grammars, dictionaries, reading-books, and commentaries were compiled to facilitate the study of the older literature. Up to the last both religion and law continued to make extensive use of the extinct language of Babylonia, which was to the ancient East what Latin was to medieval Europe. In course of time, however, an independent Semitic literature arose; a considerable proportion of the epics, for example, were written from the first in Semitic Babylonian. Texts were also written by the Semitic scribes in what was now the dead Sumerian, the results sometimes reminding us of modern 'dog-Latin.'

Education was widely extended, even women and artisans taking part in the voluminous correspondence that has come down to us (see above, *Domestic Life*). Schools and libraries existed in the towns, the collections of books being numbered and arranged on shelves. The libraries were provided with catalogues, and were under the charge of librarians. Different libraries naturally had their special classes of literature. At the old seaport of Eridu, for instance, the temple of Ea, the Babylonian god of culture, possessed copies of a particular ritual with hymns to the gods, as well as a series of works containing spells for driving away disease. Larsa had its hymns to the sun-god, Ur its hymns to the moon-god. One of the most interesting collections is the series of exorcisms

called *surpu*, in which the priest, before granting absolution to the penitent, requires him to confess the sins of which he has been guilty. 'Has he set his parents or relations at variance; has he spoken evil of his father or mother; has he lied, stolen, dishonoured his neighbour's wife, or committed murder?' are among the questions put to him.

The epics constituted an important section of the literature. Chief among them is the Epic of Gilgames in twelve books, largely compiled out of older materials. Gilgames was half-mortal, half-divine; after delivering Erech from its enemies he was wooed in vain by the goddess Istar, who by way of revenge sent a mighty bull to ravage the land. The hero and his friend, the satyr Engidu, slew the bull; but the gods in return caused Engidu to die, while Gilgames himself was smitten with disease. Gilgames then wandered beyond the gates of the sun and the waters of death in search of Utu-napisti, the Babylonian Noah, who had been translated after the Deluge without dying, and from whom he hoped to learn the secret of escaping death. In the eleventh book of the epic Utu-napisti recounts the story of the Deluge, which closely resembles that in Genesis, and bids Gilgames gather a particular plant which will ensure his immortality. On his way home, however, a serpent

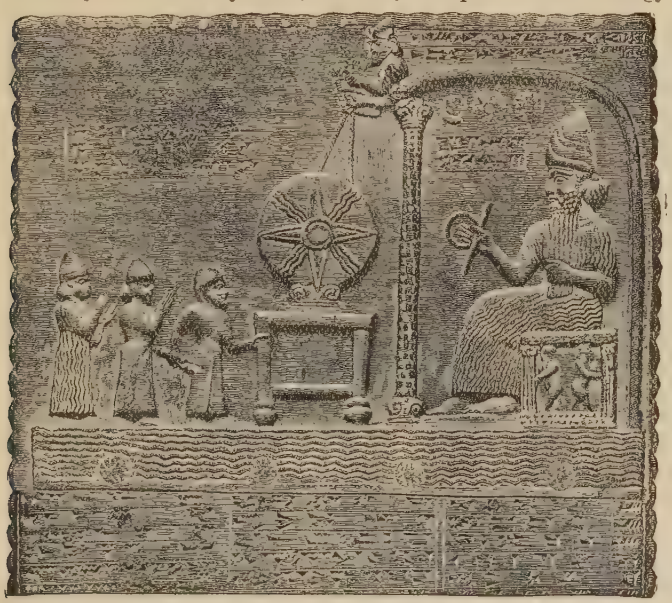


Fig. 4.—Upper half of 'Sun-god Tablet'—priests and king adoring the sun's disc (British Museum).

carried away the plant, and the hero was made to understand that death must be the lot of every man. The same lesson is inculcated in the Epic of Adamu, the first man, who was created by Ea at Eridu. Adamu broke the wings of the south wind, and was accordingly summoned to appear before the court of the gods. Here he refused 'the food of life,' fearing that it was 'the food of death,' and thereby, along with his descendants, lost the gift of immortality. The Epic of Etana describes how the first king endeavoured to obtain the insignia of sovereignty by mounting to the sky on the back of an eagle; after reaching the heaven of Anu, however, he fell to the ground while attempting to ascend to the gate of Istar, and was dashed to pieces, while the eagle was destroyed by a serpent whose young it had devoured. The legend of the god Zu (the storm-demon) tells how he stole the tablets of destiny from Bel, and how god after god declined to pursue him until Lugal-banda at last overreached him in the mountains of Sabu. Another epic describes the devastating career of Urra the plague-god, who punished mankind for their sins.

Among other contents of the Babylonian libraries may be mentioned historical documents, copies of letters, astronomical, astrological, mathematical, and medical works, omen-texts, and lists of countries, cities, and gods. School exercises have come from the schools attached to the libraries and temples, while there were archive-chambers filled with official documents as well as vast collections of legal and commercial tablets.

Religion.—During the long period over which the monuments and inscriptions extend, numerous changes took place in the religion of Babylonia. Sumerian religion can be traced back to a sort of Shamanism, according to which every object in nature was regarded as the abode of an indwelling spirit or life (Zi), which controlled its actions and its relationship to man. Round this primitive creed grew up a body, not of priests, but rather of medicine-men or exorcists, who dealt mainly with the malevolent spirits of disease and the hostile powers of nature injurious to the life of man.

The liturgy of these priests is found in the magical texts, large numbers of which have been preserved in the libraries of Nineveh and Babylonia. Gradually the vast host of spirits became grouped in a hierarchy of the spirits of the heavens and the earth; and from these came the first gods of the Sumerian pantheon. Under this new development a number of local gods grew up, and each city had its divine patron, who was worshipped there in a strictly henotheistic form—that is, he alone in his sacred city was supreme among the gods. Thus, in a beautiful litany from Ur of the Chaldees, it is said of the moon-god, 'In heaven who is supreme? Thou alone art supreme! On earth who is supreme? Thou alone art supreme!' Similar words are found in the local hymns to Merodach in Babylon, and to Nebo in Borsippa. One of the earliest seats of religious culture in Chaldea appears to have been the city of Eridu, then on the shore of the Persian Gulf, where was the seat of Ea, the culture-god of Babylonia, who presided over the water and had his home in the sea. Among other titles he is called 'lord of wisdom,' 'he who knows all things,' 'the lord of revelation.' He was, in fact, the fish-divinity, termed Oannes by Berossus, who taught the elements of culture to the first inhabitants of Chaldea. The consort of Ea was Dav-kina, 'the lady of the earth,' who personified the earth just as Ea represented the sea. Water and the earth were, according to the ancient theogony of the city of Eridu, the two elements out of which all the world proceeded. This pair had a son, Tammuz, 'the only begotten one,' who, in the creed of Babylon, was replaced by Marduk or Merodach. The worship of Tammuz in association with his consort Istar reached a high development in Babylonia, and spread over the whole of Western Asia. Next in importance among the local deities came the god Mul-lil or El-lil, the elder Bel of the Semitic creed, whose sacred city was Nippur, the

modern Niffer. This great god, whose name means the 'lord of the ghost-land,' was also the ruler of 'earth and mankind,' and, according to one version of the Deluge legend, was the deity who caused the destruction of the wicked. The mistress of the ghost-land was the goddess Ninkigal or Allat, 'the lady of the great land' of Hades. She was the queen who ruled in the dread 'land of no return,' and 'whose city and palace walls were clothed in dust, the inhabitants thereof wearing robes of feathers like birds.' The messenger of this dread pair was Namtar, the demon of fever and goddess of fate, who spread disease and death abroad. Anu, the god of the sky, the centre of whose worship was at Erech, completed the trinity of the three supreme gods, El-lil, Ea, and Anu. Below them came another trinity, that of the moon-god, the sun-god, and Istar, the evening star. The moon-god, worshipped at Ur, under the name of Nannar, took precedence of the sun-god. At Sippara and Larsa, however, Samas, the sun-god, became the head of a special cult which absorbed many of the other older gods, and each city had its local sun-god or solar hero. In Southern Babylonia Larsa was the chief seat of solar worship. It was, however, in the northern city of 'Sippara of the sun,' and in the most ancient temple of E-Bábara, 'the house of lustre,' that it attained to its highest development. The tablet of which a representation is given (fig. 4) was erected by Nebobaladan, king of Babylon, an ardent votary of the worship of the sun-god, about 900 B.C. The god is seated on a square seat, placed inside a porch supported by pillars, and holds in his hand a ring and a short rod. Before the pillar stands a stool with legs, bearing a figure of the disc of the sun, apparently supported by cords which are held in the hands of two attendant spirits from the roof. Of the three figures standing with their faces turned towards the disc, the first is a priest, who holds the stool with his left hand, while with his right he grasps the left hand of the second figure—the king, whose right hand is raised in adoration to the god. The third figure behind the king has both hands raised in adoration. Above the heads of the three figures are three lines of inscription: 'The image of the Sun-god, the mighty lord, the dweller in the temple of Uri, which is within Sippara.' Under the god are carvings of two figures, and above are three circles, representing the new moon, the sun, and Istar or Venus. The inscription below them explains that the canopy over the head of the god, like the rope which caused his disc to revolve, was the divine serpent. The rise and spread of the sun-creed in Babylonia mark a great change in the religious life of Chaldea in the meeting and amalgamation of Semitic and Sumerian religious thought. We have no longer to deal with the dread El-lil of the ghost-land, but with a supreme Baal, the father and creator of the universe, who rapidly absorbed all the other solar deities in the Sumerian pantheon. It is to this age that we must assign the growth and compilation of the great Epic of Gilgames, with its solar setting. This is also the age which witnessed the rise of Babylon as the capital of Babylonia, and therewith of its god Bel-Merodach, who was originally a solar deity, to supremacy over the other gods. The position attained by Merodach in the later days of the Babylonian empire approaches monotheism, and the misfortunes which overtook the country are regarded as punishments inflicted by Merodach upon his people on account of their sins. Merodach's wife was entitled Zirpanit or Zarpanit, who has been identified with the Succoth-benoth of the Old Testament (2 Kings, xvii. 30). The great temple of E-Sagila at Babylon, known to classical writers as the Tomb of Bel, was dedicated to Merodach. In its court rose the *ziggurat* or 'tower,' on the summit of which was the sanctuary of the god, furnished with a couch and a holy table. The ceremonies of service resembled those of the Jews. The daily sacrifice, the free-will offering, the meat and drink offerings, and the shewbread formed part of the ritual. The messenger and interpreter of Merodach was Nebo, 'the Prophet,' whose temple, now represented by the *Birs-i-Nimrud*, stood at Borsippa, where he was worshipped along with his wife Tasmit, 'the Hearer.' The temple was called E-Zida, 'the House Everlasting,' and the god himself was the patron of books and their writers. Among the other divinities of Babylonia may be mentioned Nin-ib, the messenger of El-lil, originally a sun-god, the reading of whose name, however, is still uncertain; Hadad or Rimmon, 'the Amorite,' who was god of the air; Nergal, the god of the dead, the patron deity of Kutha; Gibil and Nusku, the fire-gods; and the goddesses Beltis (Belit) and Nina. The goddesses, however, were little more than shadowy reflections of their husbands, with the exception of Istar, the Ashtoreth of Canaan, who originally represented the evening star. She was an independent divinity, and presided over love and marriage, and, in Assyria, over war.

The City of Babylon.—Babylon was originally merely a provincial town, and Borsippa, which afterwards became its suburb, seems to have been a more important place. We already hear of Babylon in the time of Sargon of Akkad, but it was not until the rise of the Amorite dynasty of Khammu-rabi that it became the capital of Northern Babylonia. It had probably grown up round the temple of its patron deity Bel-Merodach, which was called E-Sagila, 'the House of the Exalted Head.' The city was known by more than one name, the most common being Babili, 'Gate of the God,' originally applied, it would seem, to the quarter opening on the temple. In Hebrew a punning etymology connected the name with a word which means 'to confound.'

After being ruined by an Elamite invasion, both city and temple were restored by Khammu-rabi. Khammu-rabi's city was that which was razed to the ground by Sennacherib in 689 B.C., the rubbish being thrown into the Arakhu canal. Esar-haddon again restored it, but the Babylon so famous in classical authors was the creation of Nebuchadrezzar II. Recent German excavations have enabled us to fix the main outlines of the topography of this latter town. They have brought to light the channel of the old canals, 'the Gate' and chapel of Istar, and the great processional road, lined on either side with enamelled tiles on which lions and other monsters were represented, which led to the temple of E-Sagila. The double line of city walls, together with the gates, has also been traced. The palace of Nebuchadrezzar is represented by the mound now called El-Qasr.

According to Herodotus, the city stood on both sides of the Euphrates in the form of a square, the length of the sides being 120 stadia, and the whole circumference 60 miles. It was surrounded by a wall 200 cubits high and 50 cubits thick, and pierced with 100—or, according to Diodorus, 250—gates of bronze. At regular intervals were towers. Broad, straight streets crossed one another at right angles, and the banks of the Euphrates were united by a stone bridge. The bed of the river itself was lined with stone, and along its sides ran stone quays. Among the chief wonders of the city were 'the Hanging Gardens' constructed by Nebuchadrezzar for his Median queen. The city suffered greatly in the revolts which followed the Persian conquest, its outer walls being demolished, and the

temple of Merodach being subsequently plundered by Xerxes. Although the Persian kings made Babylon their residence, little was done for its restoration, and Alexander the Great, who, on his entrance into the city in 331 B.C., had promised to rebuild the temple, was unable even to clear away the rubbish, though 10,000 workmen were employed for the purpose during the space of two months. After his death in the palace of Nebuchadrezzar, and the foundation of Seleucia on the Tigris by Seleucus Nicator, Babylon went rapidly to decay. Stone had to be brought to Babylonia from other countries, and consequently stone buildings there which had ceased to be used became quarries out of which newer edifices were constructed, while the bricks which were ordinarily employed soon disintegrated. In the time of Pausanias there was little to be seen on the site of Babylon except the ruins of walls, and Rich was the first modern traveller to examine it scientifically. The Birs-i-Nimrud represents the temple of Nebo at Borsippa, and had nothing to do with Babel (q.v.) or Babylon.

See Oppert, *Histoire des Empires de Chaldée et d'Assyrie* (1865); Layard, *Nineveh and Babylon* (1867); Loftus, *Chaldea and Susiana* (1857); Sayce, *Hibbert Lectures* (1887) and *Gifford Lectures* (1903); Rawlinson, *Cuneiform Inscriptions of Western Asia* (1861–84); Delitzsch, *Wo lag das Paradies?* (1881); Delitzsch and Haupt, *Assyriologische Bibliothek* (1880); Perrot and Chipiez, *Art in Chaldea and Assyria* (trans. 1884); Pinches, *Guide to the Nimroud Central Saloon, British Museum* (1886); the *Trans. and Proc. Soc. of Bibl. Archæol.* (1872); works named in the articles on George Smith, Maspero, and Sayce; Jensen, *Kosmologie der Babylonier;* J. P. Peters, *Nippur* (1898); R. Koldewey, *Excavations at Babylon* (trans. 1914); L. W. King, *History of Babylonia and Assyria* (1910–15).

Babylonish Captivity, the deportation, under Nebuchadnezzar, of a large portion of the principal inhabitants of Judah, after the fall of the city of Jerusalem in 586 B.C. A large number of the inhabitants of Judah had been already carried off to Babylon in 597, when Zedekiah had become king over the remainder. It was not long before these excited the anger of the powerful Chaldean king, and the second capture of the city and captivity of the inhabitants put an end to the kingdom of Judah. They were carried to Babylon, and there they remained in tolerable comfort for 56 years, though the duration of the Captivity is usually reckoned at 70 years, dating from the earlier captivity. Many of them acquired property, and even riches; some were called to court, and even raised to high offices in the state. They were allowed the free exercise of their religion, and here Ezekiel and the unknown author of the last part of the book of Isaiah gave hope to the spiritual aspirations of the despondent people. When Cyrus overthrew the Babylonian empire (538 B.C.), he allowed the Jews to return to their own country, but only 42,360 of the tribes of Judah, Benjamin, and Levi are said to have returned. They found the depopulated territory occupied with a mixed population from the surrounding tribes and the residue of the Jewish population; and with the religious isolation they had learned in Babylon, refused to recognise these as members of their own community. See JEWS.—The name is applied in church history to the exile of the popes at Avignon from 1309 to 1377.

Babyroussa. See BABIROUSSA.

Bacau. See BAKAU.

Bac'carat (Fr. *baccara*) is one of the most widespread French games of chance, played for money between a banker and several punters. In Britain, as a game of cards other than a game of skill, it is treated as 'unlawful.' See GAMING.

Bacchiglio'ne, a river of Northern Italy, rising in the Alps, and flowing 90 miles south-eastward, through the plain of Padua, and past the town of Vicenza, till it falls into the Adriatic 3 miles south of Chioggia.

Bacchus, one of the names among the Greeks and the usual name among the Romans for Dionysus, the god of wine. Originally a mere epithet or surname, it does not occur in Greek writers till after the time of Herodotus, and its use is generally confined to the god in his more riotous aspects. The name Dionysus occurs also in Latin, though not in the Augustan poets. His worship was introduced into Rome from Greece, and was amalgamated with the worship of Liber, an old Italian deity who presided over planting and fructification. The Liberalia, celebrated every year on the 17th of March, on which day youths received the manly toga, must be distinguished from the triennial Bacchanalia or Dionysia. The latter, soon after its introduction into Italy, became the cloak for shameful immorality and crime, but was finally prohibited by the senate, 168 B.C. See DIONYSUS.

Bacchyl'ides, a Greek lyric poet and contemporary of Pindar, who flourished in the 5th century B.C. at the court of Hiero of Syracuse. A few fragments of his epinikian odes have long been known. But in 1896, on a papyrus brought from Egypt to the British Museum, Dr Kenyon deciphered 1070 lines and part of nearly 200 more. Some twenty odes were thus recovered, containing much that is charming, but nothing comparable for power to Pindar. See Kenyon's edition of the text (1897), and Jebb's, with prose translation (1905).

Baccioc'chi, PRINCESS. See BONAPARTE.

Baccio della Porta. See BARTOLOMMEO.

Bach, JOHANN SEBASTIAN, was born at Eisenach, 21st March 1685. The family, which traced its origin from one Veit Bach, a baker and miller who died at Wechmar in 1619, and was exceedingly fond of music, had already produced many musicians, among whom two brothers, cousins of Sebastian's father, Johann Ambrosius, were the most eminent. Johann Christoph and Johann Michael Bach wrote several excellent motets, and their writings had considerable influence on their illustrious kinsman. The love of music was so general throughout the family, that at Erfurt, where one branch of the clan was settled for many years, the town-musicians were commonly called 'the Bachs,' even though there might not be any member of the family among them at the time. Before he was ten years old, Sebastian lost his father, and was placed under the care of an elder brother, Johann Christoph, who was organist at Ohrdruf. He undertook the boy's musical education, but apparently in dread of his too rapid progress, kept from him a manuscript volume of organ pieces by various masters. Sebastian managed to obtain possession of the book by drawing it through the lattice of the bookcase in which it was locked away, and to copy its contents, working only by the light of the moon for fear of detection; his sole reward for six months' labour was the confiscation of his copy on its discovery by his brother. In 1700 he entered the choir of St Michael's school at Lüneburg, remaining there, after his beautiful soprano voice had broken, as accompanist on the harpsichord, and also as a violinist. During this period he made several excursions to Hamburg, where a cousin of his, Johann Ernst Bach, was living, in order that he might hear the famous organist Reinken play. In 1703 he was given a court appointment at Weimar, where he had the opportunity of hearing a great deal of Italian instrumental music; in that year,

asked to report on the organ at Arnstadt, where he had many relatives, he was given the post of organist to the New Church, and it was here that he began to compose in real earnest. Many of his 'church cantatas' were written here, as well as the famous 'Capriccio on the Departure of a Brother,' composed when his brother, Johann Jakob, went to join the Swedish Guard. In October 1705 he obtained four weeks' leave of absence in order to go to Lübeck and hear Buxtehude, the great Danish organist and composer, who was then nearly seventy years old. Bach was so delighted with him and his compositions that he outstayed his leave of absence, and on his return the authorities censured his conduct in this and other matters, such as accompanying the hymns in a manner that did not suit the taste of the congregation. His intimacy with a cousin of his, Maria Barbara Bach, who had lately come to Arnstadt, was also made a ground for reproof; so that he began to look for a new post. This he found at Mühlhausen, where he was installed in June 1707. On 17th October of that year he returned to Arnstadt in order to marry the cousin just mentioned, and settled down to his new work. He only remained at Mühlhausen one year, since a far more congenial sphere of action presented itself at Weimar, where he was appointed court organist, and in 1714 konzertmeister as well. Nine years at the ducal court did much to perfect his style as an organ composer, and some of his best cantatas were also written there. The great Italian composers of the time were studied in such a manner that Bach soon became complete master of their style, and thus prepared for his own instrumental works which were to be produced later. Many journeys were made from Weimar, the most famous of which is one that resulted in the discomfiture of a French harpsichord player named Marchand. In 1717 Bach went to Dresden, where this man's playing was universally admired; the merits of the two musicians were hotly discussed, and it was determined that Bach should challenge Marchand to a public musical competition. The Frenchman accepted the challenge, but when the day came, was nowhere to be found. He had enough perception to see that the competition could only bring defeat upon himself, and so had beaten a retreat. Soon after this, Prince Leopold of Anhalt-Cöthen offered Bach the post of capellmeister at his court, a situation which he retained till 1723. A journey to Halle, made with the purpose of seeing Handel, who was there at the time, failed of its object, as Bach got there too late; nor was a subsequent attempt to meet his great contemporary more successful. A severe calamity befell him in 1720, when his wife died during his absence with the prince at Carlsbad; he bore her loss, however, manfully, and went on with his accustomed duties, paying another visit to Reinken at Hamburg in the same year. In December 1721 he married Anna Magdalena Wülkens, daughter of the court trumpeter at Weissenfels. She was extremely musical; much of his music exists in copies made by her hand, and many of his works for keyed instruments were written for her use. Most of the well-known 'suites' date from this time, as well as many works for stringed instruments. The first half of the wonderful collection of *Forty-eight Preludes and Fugues*, called in Germany *Das Wohltemperirte Clavier*, was also written at Cöthen, the second half being composed many years afterwards. At the end of the year 1722 the post of Cantor of the Thomasschule at Leipzig became vacant, and after some difficulties and delays Bach was given the appointment. During his residence at Leipzig, all his greatest works for chorus were written, among which the most important are the two settings of the history of the Passion, in the versions of St Matthew and St John respectively, many church cantatas, the total number of which, together with those already mentioned, reached nearly three hundred, and the Mass in B minor. Two movements from this latter work were presented to Augustus III. at one of Bach's frequent visits to Dresden, where he received in 1736 the honorary title of Hofcomponist. A more famous visit was that paid to Frederick the Great at Potsdam, in May 1747. His arrival was announced to the king while a state concert was going on; Frederick immediately laid down his flute, and sent for Bach to come to court just as he was. Some pianofortes made by Silbermann were tried by Bach, who subsequently improvised on a theme given to him by the king. This theme he afterwards worked up in many different ways, and presented the result to Frederick under the title of *The Musical Offering*. This, like the *Art of Fugue*, a work begun about this time, and upon which he was engaged at the time of his death, is a monument of contrapuntal ingenuity and theoretical learning. Some two and a half years after this visit, his eyesight began to give way, and he was persuaded to have recourse to an English oculist then resident in Leipzig. The failure of an operation resulted in absolute blindness, and worse than that, the remedies used affected his health. In July 1750 he was struck with apoplexy, and died on the 28th of the month.

No composer who ever lived can be held to surpass Bach either in the ease of his intricate workmanship or in the wealth of invention with which he was endowed. The broad effects which came so easily to Handel, and by which so many thousands have been impressed, did not come within Bach's province; but in his 'B minor mass,' for instance, there are revealed depths of sorrow and heights of ecstatic adoration, which no musician before or since his time has ever attained. That his music appeals less to the untaught than to the cultivated lover of the art, cannot surely be held as a reproach. His greatest compositions for keyed and stringed instruments, taxing as they do the utmost powers of modern artists, must have been far beyond the reach of the executants of his own day. The pianist of the present day owes to Sebastian Bach not only the system of tuning by which he is enabled to play in all keys, but the method of fingering by which all his fingers are brought into requisition. Several other inventions were made by Bach, but none have been proved of lasting value. His third son, CARL PHILIPP EMANUEL (1714–88), holds an important place in the history of music, since he did much to develop the so-called 'sonata-form,' in which all classical compositions of modern times are cast, and became Joseph Haydn's master. WILHELM FRIEDMANN (1710–84), Sebastian's eldest son, dissipated his fine musical talents, leaving comparatively few compositions; the youngest son, JOHANN CHRISTIAN (1735–82) has some interest for Englishmen, since he established himself in London, holding positions there of some consideration.

Biographies by Forkel (1803; trans. Terry, 1920), Hilgenfeldt (1850), Bitter (2d ed. 1880–81), and others were superseded by Spitta's exhaustive work (1873–80; 3d ed. 1921; trans. 1884–85). Valuable criticisms have been published by Albert Schweitzer (trans. 1911) and André Pirro (1907). And there are English lives by Lane Poole (1882), Rutland Boughton (1907), Parry (1910), Sanford Terry (1928). See also works on the *Wohltemperirtes Klavier* by Riemann (3d ed. 1914) on the organ works by Harvey Grace (1922), and various books on the choral works by Terry (1915–25).

Ba'charach, a small town of Rheinland, on the left bank of the Rhine, 30 miles SE. of

Coblenz. Its name is said to be from *Bacchi ara* ('Bacchus's altar'), and the vine is still largely cultivated in the neighbourhood. The town walls survive.

Bache, ALEXANDER DALLAS (1806–67) a grandson of Benjamin Franklin, was born at Philadelphia, studied at West Point, became president of Girard College (1836) and superintendent of the coast survey (1843). He published magnetic and meteorological observations.

Bache, FRANCIS EDWARD (1833 58), born at Birmingham, showed great promise as a composer in a trio, two operettas, a concerto, and other works. His brother Walter (1842–88) became a distinguished pianist, a great exponent of Liszt, and a professor in the Royal Academy of Music.

Bachelor, a word of uncertain origin, derived, perhaps, with most probability through French from the Low Latin *baccalarius*, 'a farm-servant,' originally 'a cow-herd;' from *bacca*, Low Latin for *vacca*, 'a cow.' Odd though it seem, this will connect fairly with the special meanings of the word given by Ducange. (1) It was used, he says, to indicate a person who cultivated certain portions of church-lands called *baccalaria*, a feu belonging to an inferior vassal. (2) It indicated monks in the first stages of monkhood. (3) It was used by later writers to indicate persons in the probationary stage of knighthood—i.e. not squires simply, but knights who, from poverty and the insufficient number of their retainers or from nonage, had not yet raised their banner in the field. (4) It was adopted to indicate the first grade or step in the career of university life. As an academical title, it was first introduced by Pope Gregory IX. in the 13th century, into the university of Paris, to denote a candidate who had undergone his first academical trials, and was authorised to give lectures, but was not yet admitted to the rank of an independent master or doctor. Later it was introduced into the faculties other than theology as the lowest academical honour, and adopted by the other universities of Europe (see DEGREE, UNIVERSITY), and in this sense the Latin form came to be written, at first through mere word-play, *baccalaureus*, as if connected with *bacca lauri*, 'laurel berry.' (5) It came to be used in its popular meaning of an unmarried man, who was thus regarded as a candidate or probationer for matrimony.

The legislation of almost every country, at some period of its history, has imposed penalties on male celibates or bachelors, on the principle that every citizen is bound to rear up legitimate children to the state. In Sparta, at Athens, and at Rome, various penalties were imposed on celibates, various premiums offered for fruitfulness. In England, there are numerous instances of additional or higher taxes being imposed on bachelors and widowers, but apparently more with a view to the revenue than with any other object. Thus, an act was passed in 1695, which granted to the king certain rates and duties upon marriages, births, and burials, and upon bachelors and widowers for five years, 'for carrying on the war against France with vigour.' Every unmarried male above the age of twenty-five had to pay from 1s. to £12, 10s., according to his status. Another instance may probably be found in the higher charge for the servants of bachelors, first imposed by Pitt in 1785, and continued for a considerable time. In the income-tax of 1799, deductions were made on account of children, 5 per cent. being allowed to a person who had a family, and whose income was above £60 and under £400 a year, with corresponding deductions in other cases. The principle of allowing abatement of income-tax to a tax-payer who is the parent of living children was reintroduced in 1910. See also KNIGHTHOOD.

Bachelors' Buttons, a double-flowered Ranunculus, Lychnis, Achillæa, Pyrethrum, &c.

Bachian. See MOLUCCAS.

Bachofen, JOHANN JAKOB (1815–87), was a member of the Court of Appeal at Basel, and wrote an important work on the Matriarchate, and other works on the history of law and of civilisation.

Bacillus (late Lat., 'little rod,' diminutive of *baculus*, 'stick'), properly the name of a distinct genus of Schizomycetes, but popularly used in the same sense as bacterium. See BACTERIA.

Back, SIR GEORGE (1796–1878), Arctic explorer, was born at Stockport, and entering the navy in 1808, next year was taken prisoner by the French in Spain. With Franklin (q.v.) he had already shared in three Polar expeditions—to the Spitsbergen Seas (1819), the Coppermine River (1819–22), and Mackenzie River (1822–27)—when he started (June 1833) from a station of the Hudson Bay Company in search of Captain Ross, who was supposed to have been lost in his attempt to discover the North-west Passage. After passing a terrible winter with his companions near the Great Slave Lake, he discovered, in 1834, Artillery Lake and the Great Fish River, or Back's River, which he traced to its mouth. Hindered by the ice from proceeding along the coast, he returned by the river, and did not reach England till the autumn of 1835, when he was raised to the rank of captain by order in council, an all but unprecedented honour. In 1836 and 1837 he further explored the Arctic shores; and of this, as of the preceding voyage, he published a vivid description. He was made admiral in 1857; but he was unable for further active service.

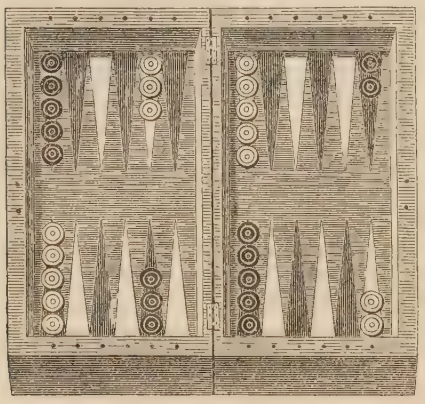
Bačka. See BÁCSKA.

Backbone. See SPINAL COLUMN, also VERTEBRATA.

Backergunge. See BAKARGANJ.

Backgammon, a game of considerable antiquity in England, where, until the 17th century, it was known by the appellation of 'the tables.' Apparently the word is merely 'back-game,' and may have been given because the two players have to bring their men *back* from their antagonist's tables into their own, or because the pieces are sometimes taken up and obliged to go *back*—i.e. re-enter at the table they came from. The French name is *tric-trac*. Backgammon is played with a board or tables, men or pieces, dice, and dice-boxes. The introduction of dice into the game, and their constant use in determining moves, makes backgammon essentially a game of chance. The backgammon board consists of two parts or tables, each possessing twelve points, six at each end, which points are coloured white and black alternately. The game is played by two parties, and with 30 pieces or men. Each party has 15 men, one set of 15 being black, and the other white. In beginning the game, the men are placed on certain points on the tables, as shown in the following figure. The game is played with two Dice (q.v.) and two dice-boxes. The dice are common to both; but each party uses his own dice-box, and the throws are alternate. If a player throws *doublets*, or both dice of one number, double the number of dots is reckoned; thus, by a throw of two aces, the player does not count 2, but 4. These numbers thrown or accidentally turned up by the dice bear a reference to the points on the tables. In order to understand this connection between the dice and the men, the learner must observe how the men are placed on the points, and the rules by which their shifting from one to another is governed.

The tables are here spread out as if two persons were seated, and about to begin to play. The player owning the white men is seated at W, and the player owning the black men at B. We shall call one player White, and the other Black. White counts round from the ace-point of Black, and Black counts round from the ace-point of White.



The Backgammon Table.

These ace-points are respectively seen to have two men upon them in opposite corners of the same table. The grand object of the game is for each party to get all his men played round into the table containing the aces, removing them from point to point agreeable to the throws of the dice. In throwing, the number upon each die turned up may be reckoned by itself, or collectively, with the number on the other die. Thus, if 4 be thrown by one die, and 6 by the other, a man can be advanced 4 points, and another 6 points; or one man can be advanced 10 points, always providing that a point is open to suit this movement to it. No point can be moved to if covered by two men belonging to the adversary. If covered by only one man, which is called a *blot*, then that man can be hit, and be removed from the point, and placed on the bar between the tables, his place being taken by the man who has won it. The removal of a man to the bar throws a player considerably behind in the game, because the man must remain out of the play till the dice turn up a number corresponding to an open point on the adversary's table. Being fortunate to get an open point by this means, the man must be entered and wrought round from thence, as in the case of others in the set to which he belongs. The frequent occurrence of this hitting of a blot gives an adversary a great advantage, and allows him to win the gammon. There are two kinds of victory—winning the hit, and winning the gammon. The party who has played all his men round into his own table, and by fortunate throws of the dice has borne or played the men off the points first, wins the *hit*. The gammon may be explained as follows: When you have got all your men round to your own table, covering every point, and your adversary has a man out, then you are enabled to *bear* or lift your men away. If you can bear all away, so as to clear your table before the adversary gets his man placed by a throw on your table, you win the gammon. If the adversary has been able to bear one before you have borne all your men, it reduces the victory to a hit. Two hits are reckoned equal to one gammon in playing matches. To win two games out of three is called winning the *rub*, as at whist.

Backhaus, Wilhelm, pianist, born at Leipzig, 26th March 1884, studied at the Conservatorium there, and under Eugen D'Albert at Frankfurt-am-Main.

Backhuysen, or Bakhuizen, Ludolf, a famous marine painter of the Dutch school, was born at Emden in East Friesland, in 1631, and in 1650 was placed as a clerk in Amsterdam, but soon devoted himself to painting. His most famous picture is the sea-piece in the Louvre, sent in 1665 as a present to Louis XIV. by the magistrates of Amsterdam. His colouring is excellent, though somewhat cold. He etched on copper, and gave lessons in caligraphy. He died in 1708.

Back River, or Back's River. See Great Fish River.

Bacolor, a town of the island of Luzón, in the Philippines, 10 miles NW. from Manila; pop. 13,000.

Bacon, the back and sides of a pig cured in the manner described at Ham.

Bacon, Delia, American authoress, born 1811, died 1859. She was eminent in her day as a teacher, and wrote several stories, but is now remembered only as an eloquent advocate of the theory that the plays of Shakespeare were written by Lord Bacon. She herself did not originate the idea, but was the first to give it any currency, in her *Philosophy of the Plays of Shakespeare Unfolded* (1857). The book had the honour of a preface from the pen of Nathaniel Hawthorne, and the theory has been accepted by not a few persons in England, America, and Germany, who have devoted ingenious reasoning to its advocacy. A biography by T. Bacon (1889) gives the pathetic story of Delia Bacon's life.

Bacon, Francis, Lord Verulam and Viscount St Alban, or St Albans, born at York House, in the Strand, London, 22d January 1561, is usually (apparently even by himself) called Lord Bacon. The younger son of Sir Nicholas Bacon (q.v.) by his second wife Ann, second daughter of Sir Anthony Cooke, Edward VI.'s tutor, he passed his boyhood with his brother Anthony under the stern discipline of his mother, a woman of powerful will and a zealous Calvinist. When twelve years old, he, with Anthony, entered Trinity College, Cambridge, where the brothers remained till Christmas 1575. In June 1576 they began to study law as 'ancients' of Gray's Inn. A year later, Bacon went to Paris in attendance on the ambassador Sir Amias Paulet, but his father's death recalled him in 1579. Little property fell to his share, and he applied himself anew to the law, being called to the bar in 1582, and becoming a bencher of his inn in 1586.

From an early age Bacon exhibited extraordinary intellectual capacity. Queen Elizabeth noticed his precocity when he came to court with his father: at Cambridge the youth recognised the barrenness of scholastic philosophy and the need of educational reform, and soon afterwards became conscious of power in himself to apply to science original methods of study, which should extend man's knowledge of nature beyond any limits yet reached. To fulfil this ambition he resolved to adapt his career. Lucrative employment was necessary to supply him with the means of research, and he was twice injudicious enough (1580 and 1592) to assert openly that he subordinated everything to his 'contemplative ends,' when petitioning the powerful minister Burghley, who had married his mother's sister, for place about the court. Burghley declined to aid him, and to advance his worldly interests Bacon added to his legal practice an independent pursuit of politics. He became member of parliament for Melcombe Regis in 1584, for Taunton in 1586, and for Middlesex in

1593; and sought to attract the queen's attention by addressing to her a paper of advice in 1584, in which, with a boldness unique in a barrister of three-and-twenty, he argued for more tolerance in the treatment of recusants, and by writing in 1589 a statesmanlike pamphlet on the controversies in the Anglican Church, in which he pleaded for elasticity in matters of doctrine and discipline. These efforts were overlooked, and in 1593 he offended the queen by opposing in parliament the grant of a subsidy. Meanwhile, in despair of obtaining any favour from Burghley, Bacon attached himself to the brilliant and impulsive Earl of Essex, Burghley's rival at court, through whom he thought to put into effect some of his political schemes. Essex, who also took Bacon's brother Anthony into his service, strove in vain to obtain for Bacon in 1593 the office first of attorney and then of solicitor general, and in 1596 that of master of the rolls. Bacon's disappointments were embittered by want of money, and he gladly accepted from Essex a gift of land at Twickenham. To enable Essex to secure a permanent hold on the queen's favour, Bacon recommended him to employ petty tricks of flattery, which were ill adapted to his frank and impulsive character, and Bacon soon found that he had misunderstood his patron. He advised him in 1598 (although he afterwards denied having done so) to undertake the suppression of Tyrone's great rebellion in Ireland, and when the earl returned thence in disgrace (September 1599) and was tried in June, Bacon, was constrained to act (in a subordinate capacity) with the prosecuting counsel, in the hope, as he said, of aiding his patron. Essex was dismissed from all offices of state, and released in August. Bacon, like his brother Anthony, seemed anxious for his reinstatement in the queen's favour, but when Essex broke into open rebellion in January 1601, Bacon deserted him and at the trial spoke unreservedly towards his conviction for treason; drew up after the execution the official declaration of Essex's treasons; and apologised in another paper for his own conduct, on the ground that the maintenance of the state is superior to private ties of friendship.

In the last years of Elizabeth's reign, Bacon tried, in and out of parliament, to act the part of mediator between crown and commons, and recommended a tolerant policy in Ireland. On James I.'s accession (1603), Bacon sought royal favour by extravagant professions of loyalty; by planning schemes for the union of England and Scotland, and for pacifying the Church of England on comprehensive lines; and by making speeches in parliament, in which he tried to prove that the claims of the king and parliament could be reconciled without degrading either estate. For these services he was knighted (23d July 1603), and was made a commissioner for the union of Scotland and England. In 1604 he received a pension of £60 a year in consideration (as the patent stated) of James's respect for his brother Anthony, who had died in 1601, after proving himself a staunch champion of the Scottish succession. In 1605 Bacon showed how his leisure had been employed, by publishing the *Advancement of Learning;* and on 10th May 1606 he married Alice Barnham, a London alderman's daughter, of whose personal character nothing is known. His public fortune had now changed. On 25th June 1607 he became solicitor-general, after a delay caused partly by the opposition of Burghley's son and successor, Sir Robert Cecil, and partly by Bacon's unwillingness to serve under Sir Edward Coke, a personal enemy, who was attorney-general till 1607.

In the last session of James's first parliament (February 1611) the differences between crown and commons grew very critical, and Bacon assumed his former rôle of mediator, although he confessed his distrust of James's chief-minister, Cecil (now created Lord Salisbury). At the same time he argued in published tracts that reform could best be assured by a liberal use of the king's prerogative. On Salisbury's death in 1612, Bacon informed the king that he was willing to devote himself exclusively to politics, and offered to manage parliament and to obtain supplies without concerting undignified bargains after Salisbury's discredited methods. He was disappointed of the office of master of the wards at this time, but, on 27th October 1613, was promoted to the attorney-generalship. In the 'Addled Parliament' of 1614 Bacon was still sanguine of effecting what he called his policy *e gemino*, according to which the interests of king and people should be made to coincide. A sympathetic atmosphere between the two bodies was to be developed, and mutual concessions were to follow, accurately defined and spontaneously rendered. In October 1615 he pleaded in vain for a new parliament, while re-enunciating his sanguine views. By that date Bacon saw that James was as little likely as Essex to adopt his domestic policy, and soon perceived that the bold handling of foreign affairs, which he regarded as essential to the conservation of patriotism, was alien to the nature of a king who delighted in intricate diplomacy. But Bacon craved for personal advancement with increased eagerness, and henceforth he obtained it by suppressing his real opinions, by conventional flattery of all who could serve him, and by systematising petty tricks of conduct in order to circumvent the opposition of those likely to obstruct him.

In 1615 two prosecutions in which he engaged illustrate his servility. In one, Oliver St John was prosecuted for denouncing the illegality of benevolences, and made his submission. In the other, Edmund Peacham, an old Somersetshire clergyman, was charged with having written a sermon, which he had not preached, justifying insurrection under certain circumstances. Torture was applied with Bacon's assent, although not at his suggestion, and Bacon examined the prisoner while undergoing it, without extracting any information. It was then resolved to prosecute Peacham for treason in the King's Bench, and Bacon undertook to confer separately and privately with each judge of the court, in order to secure a conviction. Three judges yielded to Bacon's advice, but Coke resisted, and at the trial denied that Peacham, who was convicted and died in prison, was guilty of treason. In 1616 Bacon prosecuted Somerset, with whom he was intimate, for the murder of Overbury, and in that and the next year helped to secure Coke's dismissal from the bench, on the grounds, first, that the judge denied the superiority of the Court of Chancery to his own Court of King's Bench, and secondly, that he allowed the king's prerogative to be questioned in an exchequer case.

On 9th June 1616 Bacon became a privy councillor, and on 7th March 1617 Buckingham, whom Bacon had persistently courted, obtained the lord-keepership for him. On 7th January 1618 he became lord chancellor, and on 12th July he was raised to the peerage as Lord Verulam. The title was taken from *Verulamium*, the Latin name of St Albans, near which lay Bacon's estate of Gorhambury. Bacon's obsequiousness was now more marked than ever. He accepted the king's policy of the Spanish marriage, although it was hostile to all his principles, and by exceptional self-abasement averted a quarrel with Buckingham, whose brother's marriage with Coke's daughter Bacon had vindictively opposed. A word from Buckingham influenced his behaviour to suitors

in the Court of Chancery, where he worked hard in clearing off arrears. In one case, a Dr Steward complained to Buckingham that Bacon had decided a case against him; Buckingham wrote to Bacon expressing his surprise, whereupon Bacon cancelled his decision, and referred the case anew to arbitrators outside the court. Bacon was on the side of severity in the cases of Raleigh (1618) and of his own friend Sir Henry Yelverton (1619). In 1620 he advised the summoning of a new parliament; on 12th October in that year published his *Novum Organum;* and on 26th January 1621, was created Viscount St Albans. But his fall was now at hand. The Commons, led by Bacon's enemy Coke, first inquired into a recent increase of monopoly-patents, by which Buckingham had enriched his relatives. Bacon had argued for their legality, and parliament was anxious to call him to account for this opinion, but the king refused to sanction the step. Complaint was then made that Bacon was in the habit of taking bribes from suitors in his court, and on 17th March 1621, charges were sent to the House of Lords by the Commons for inquiry. Bacon fell ill. That he took presents from suitors was undeniable, but that he allowed these gifts to influence his judicial decisions has been disputed with some effect. Nevertheless, the Steward case shows that Bacon was guilty, in one instance at least, of polluting justice. On 20th April, a copy of the accusation was sent him, and a week later he submitted himself to the will of his fellow-peers, without offering any defence. It was ordered that he be fined £40,000, be imprisoned during the king's pleasure, and be banished parliament and the court. In June he was released from the Tower, and retired to his family residence at Gorhambury, near St Albans. In September the king pardoned him, but declined to allow him to return to parliament or the court. Bacon employed himself in literary work, completing his *Henry VII.* and his Latin translation of his *Advancement* (*De Augmentis*). In March 1622 he offered to make a digest of the laws, but no further notice was taken of him in spite of the frequent petitions that he addressed to Buckingham, James I., and James's successor, Charles. In March 1626 he caught cold while stuffing a fowl with snow near Highgate, in order to observe the effect of cold on the preservation of flesh. He was removed to the neighbouring house of Lord Arundel, where he died on 9th April. He was buried in St Michael's Church, St Albans. He was fond of pomp in his domestic arrangements, and died deep in debt.

Bacon's literary work occupied the greater part of his time throughout his life. It is divisible into philosophical, purely literary, and professional writings. To the first the chief importance is to be attached. Bacon's philosophy is to be studied in (1) *The Advancement of Learning* (1605), a review in English of the state of knowledge in his own time, and its chief defects; (2) *De Augmentis Scientiarum* (1623), a Latin expansion of *The Advancement;* and (3) *Novum Organum, or Indications respecting the Interpretations of Nature* (1620), which was intended to form the second book of a never-completed greater treatise, *Instauratio Magna*, a review and encyclopædia of all knowledge. To the *Novum Organum*, preliminary drafts of which are to be found in a number of detached pieces, *Cogitata et Visa*, *Temporis Partus Masculus*, &c., was prefixed a *Distributio Operis*, a plan of the greater work; and in *Historia Ventorum* (1622), *Historia Vitæ et Mortis* (1623), *Historia Densi et Rari* (1658), and *Sylva Sylvarum* (collection of collections, 1627), materials chiefly consisting of digested facts of natural history, for other portions of the *Instauratio*, are extant.

Bacon's system for interpreting Nature which was to lay the foundations of the natural sciences is exhibited in all these works. He first abandons the deductive logic of Aristotle and the schoolmen, in which preconceived theories were constructed without reference to actual fact, and were syllogistically arranged to lead to elaborate conclusions never tested by observation and experiment. Bacon relied on inductive methods—on the accumulation and systematic analysis of isolated facts to be obtained by observation and experiment. From this assemblage of facts alone were any conclusions to be drawn. The induction was to rest not on a simple enumeration of phenomena, a method familiar to predecessors of Bacon, but on their careful selection and arrangement, with necessary rejections and eliminations. 'Phantoms of the human mind'—'idols' (*eidōla*) of the tribe, the cave, the market-place, and the theatre, as Bacon called them—inherited by man, or produced by his environment, were exposed and swept aside. Nothing was to obscure the 'dry light of reason.' Bacon took all knowledge for his province, and his inductive system was to arrive at the causes not only of natural but of all moral and political effects. While developing his new scientific method, Bacon made some shrewd scientific observations. He described heat as a mode of motion, and light as requiring time for transmission, but he was behind the scientific knowledge of his time; he makes no mention of Harvey's discovery of the circulation of the blood, of Napier's logarithms, or of Kepler's calculations, and rejected the Copernican astronomy. His system was never finished. He never reached his examination of metaphysics—of final causes—which was to succeed his treatment of physics.

His greatness consists in his repeated insistence on the facts that man is the servant and interpreter of Nature, that truth is not derived from authority, and that knowledge is the fruit of experience. The impetus which his inductive methods gave to future scientific investigation is indisputable. As he himself described it, he 'rang the bell which called the other wits together.' He was the practical creator of scientific induction, and although succeeding scientific experimentalists may have been unconscious of their indebtedness to him, their chief results are due to their adoption of his logical method. An attempt has been made to credit Bacon with the parentage of the English philosophy of Hobbes, Locke, and Hume. That Bacon, like these philosophers, was an empiricist or realist is obvious; but that his philosophy was systematic enough to originate a school of thought, in the same sense that Descartes and Hegel founded a philosophic school, is untrue.

As a writer of English prose and a student of human nature, Bacon is seen to best advantage in his Essays, ten of which were first published in 1597; after passing through new editions in 1598, 1604, 1606, and 1612, they reached the final number of 58 in 1625. Full of practical wisdom and keen observation of life, written in concise language of extraordinary pith and dignity, they illustrate the worldly shrewdness of their author, as well as his quickness and accuracy of perception. His *History of Henry VII.* (1622) shows scholarly research, besides a direct and nervous style. In his fanciful *New Atlantis*, Bacon suggests the formation of scientific academies—a suggestion to which the foundation of the Royal Society has been traced. Bacon's *Apophthegms* (1625) are a disappointing collection of witticisms. His religious works included prayers and verse translations of seven Psalms (1625), which display a personal piety difficult to reconcile with his conduct. And neither his Psalms nor two or three other poems credited to

him on doubtful authority suggest poetic power. Bacon's professional works embrace *Maxims of the Law* (1630), *Reading on the Statute of Uses* (1642), pleadings in law cases, and speeches in parliament. He seems to have called himself (on his title-pages) 'the Lord Bacon' as well as 'Viscount St Alban;' and from Archbishop Tenison to Macaulay and since, it has been usual to refer to him as Lord Bacon, and not as Lord Verulam or Lord St Alban.

'For my name and memory,' Bacon wrote in his will, 'I leave it to men's charitable speeches and to foreign nations and the next ages.' An unparalleled belief in himself, which justified to himself his ignoring of all ordinary laws of morality, is the leading feature in his character. He was taught by the example of the Macchiavellian politicians who were his father's friends to disregard elementary notions of right and wrong; in early youth he was conscious from the first of the possession of intellectual power which, if properly applied, could revolutionise man's relations with nature, and as a consequence he recognised no justice in any moral obstacle which might prevent his attainment of such material wealth and position as would enable him to realise his intellectual ambition. Neither Macaulay's mingled contempt and admiration, nor Pope's popular epigram in his *Essay on Man* (iv. 281–2)—

> If parts allure thee, think how Bacon shined;
> The wisest, brightest, meanest of mankind—

is an adequate summary of his character. Bacon found it necessary to turn much of his attention to politics in his attempt to gain worldly power, and showed there some of his mental capacity. But he was never absorbed in politics, and always regarded himself (as he phrased it) in great part a stranger in the political sphere; his political principles were not large enough or definite enough to enable him to play a commanding part in the constitutional crisis. He did not make sufficient allowance at any time for the natural dispositions and abilities of the men with whom he worked. He drew up practical rules and sketched out elaborate tricks for the conduct of those who, like himself, were the architects of their own fortunes. But he failed entirely as a manager of men. It is only in scientific and literary work that he was great; but there very few have proved greater.

Dr Rawley, Bacon's chaplain in 1638, and Isaac Gruter in 1653, at Amsterdam, issued imperfect collected editions of Bacon's works. Others followed in 1655 (at Frankfort), in 1730 (by Blackbourn), and in 1825–36 (by Basil Montagu). The last was superseded only by the complete edition of Spedding, Ellis, and Heath (14 vols. 1857–74), seven volumes of which were devoted to the apologetic *Life and Letters* by James Spedding. For the Baconian system, see also Kuno Fischer's *Francis Bacon von Verulam* (1856; Eng. trans. 1857); Professor Fowler's edition of the *Novum Organum* (1878); and Professor Nichol's *Francis Bacon: his Life and Philosophy* (2 vols. 1890). For bibliography, see Life by G. W. Steeves (1910). Macaulay's brilliant attack on Bacon's character, and eulogy of his philosophy (first issued in *Edinburgh Review*, July 1837), lack sobriety in both sections. S. R. Gardiner's account of Bacon in his *History* and in the *Dictionary of National Biography*, where Bacon is represented as a far-seeing politician, Dean Church's monograph in the Men of Letters Series (1884), and Dr Abbott's *Life* (1885), form valuable commentaries on Spedding's conclusions.

Bacon JOHN (1740–99), sculptor, was born in London, and, trained as a modeller and painter on porcelain, in 1769 he received the first gold medal for sculpture awarded by the Royal Academy, of which next year he was made an associate, in recognition of the high merit of his statue of Mars. Among his principal works are the monuments to Lord Chatham in Westminster Abbey and the Guildhall, to Howard and Johnson in St Paul's, and to Blackstone at All Souls' College, Oxford. Bacon's success aroused great jealousy, and his rivals claimed that he was deficient in imagination, and had no refined perception of beauty; but some of his emblematical figures display perfect classical taste. See Life by Richard Cecil (1801).

Bacon, SIR NICHOLAS, was born in 1509, most likely at Chislehurst, Kent, and passing from the abbey school at Bury to Corpus College, Cambridge, (1523), was ten years later called to the bar. In 1537 he was appointed solicitor to the Court of Augmentations, and in 1539, on the dissolution of the monasteries, he presented to Henry a reasonable project for applying their revenues to the founding of a college for the study of diplomacy. Unfortunately, the king had already dispersed the forfeited estates. Of these the young lawyer received no small share; and in 1546 he was advanced to the office of attorney of the Court of Wards. During Mary's reign his Protestantism cost him all his public honours and emoluments; but on her death in 1558, he received from Elizabeth the post of lord keeper of the Great Seal. Elizabeth left to him and to Cecil 'the ordering of church matters for the most part;' and Parker chiefly owed to him the see of Canterbury. He was always honestly opposed to Catholics generally, above all, to Mary of Scotland. Elizabeth honoured him with several visits—one of six days in 1577, at his magnificent mansion of Gorhambury, Hertfordshire. He died at York House, his London residence, 20th February 1579. A profound lawyer, and all but a great orator, Sir Nicholas was one of those solid and stately Englishmen to whose sagacity, high principle, and firm demeanour England owed its safety in that critical period when Elizabeth mounted the throne.

Bacon, ROGER, a philosopher of the 13th century, who, through the force of his intellect, raised himself far above his age, made wonderful discoveries in several sciences, and contributed much to extend the then scanty knowledge of nature. Belonging to a well-to-do family, he was born probably in Dorset, near Ilchester, about the year 1214. He studied at Oxford, probably under Grosseteste and Rich, and lectured there and later at Paris. About 1250 he returned to Oxford, and possibly then entered the order of the Franciscans. Physics seems to have been at that time the chief object of his labours; and liberal friends of science supplied him with the means of pursuing his researches. In exploring the secrets of nature, he made discoveries and invented applications which were looked upon by the ignorant as the work of magic. This prejudice was encouraged by the jealousy and hate with which his brother friars regarded his superiority. For ten years (*c.* 1256–66) he was in Paris again, in ill-health, but not, as is often said, in prison. Among the clear-sighted men who had heard of Bacon's genius was Guy de Foulques, archbishop of Narbonne. He desired to see Bacon's writings, but the interdiction of the Franciscans prevented a compliance with his wish. On Guy's ascent, however, of the papal throne as Clement IV. in 1265, Bacon wrote to him expressing his readiness to furnish him with whatever he desired, and Clement in reply repeated the request to see his works. Bacon accordingly drew up his *Opus Majus*, which he sent, along with other works, it is said, to the pope, by his favourite pupil, John of London, and in which he represented the necessity of a reformation in the sciences through a diligent study of the languages and of nature. How Clement received them is unknown; but they could only have reached him about the time he was seized with his last illness in 1268. Bacon seems about this time to have returned to Oxford. In 1277 the

general of the Franciscan order, Jerome of Ascoli, declared himself against Bacon, forbade the reading of his books, and issued an order for his imprisonment, which was sanctioned by Pope Nicholas III. When in 1288 Jerome himself became pope, under the name of Nicholas IV., Bacon sent him a treatise on the means of warding off the infirmities of old age, with a view to convince him of the harmlessness and utility of his labours, but in vain. He seems to have at last recovered his freedom in 1290 or 1292, and in the latter year (or possibly 1294) to have died at Oxford. He criticised the scientific method of his time, condemned dependence upon authority, custom, and popular opinion, and the pretended knowledge that conceals ignorance. Mathematics applied to observation he considered to be the only means of arriving at a knowledge of nature. He believed in the philosopher's stone and in astrology. His chief invention is the magnifying-glass. There are also in his writings other new and ingenious views on optics—for example, on refraction, on the apparent magnitude of objects, on the great increase in the size of the sun and moon in the horizon. On other subjects, again, he fell into the greatest errors. He made several chemical discoveries which were wonders at that time. He knew, for instance, that with sulphur, saltpetre, and charcoal we may produce explosions. He studied several languages, and wrote Latin with great elegance and clearness. Deserving of honourable mention are his discoveries of the errors that prevailed in the calendar, his proposals and data for remedying them, and his rectified calendar. He wrote also on Greek and Hebrew grammar, and was perhaps author of a *Speculum Astronomiæ* usually ascribed to Albertus Magnus. He had amply earned his title of 'Doctor mirabilis.'

Six of his works were printed in 1485–1614; Jebb edited the *Opus Majus* in 1733, as did Bridges in 1897–1901 (3 vols., the last correcting errors in the first two). Brewer had done the *Opus Tertium, Opus Minus,* and part of the *Compendium Philosophiæ* in 1859. Rashdall issued the (fragmentary) *Compendium Studii Theologiæ* (1911). Duhem discovered in 1905 in the Paris National Library a missing portion of *Opus Tertium,* which was really meant to be an expansion of the *Opus Majus;* and Little discovered in Winchester College, and published in 1912, a second missing portion. Steele has given us, in *Opera Hactenus Inedita* (1905 *et seq.*), parts of the *Compendium Philosophiæ.* R. B. Burke translated the *Opus Majus* (1928). There are books on Bacon and his philosophy by Charles (Paris, 1861), Siebert, Schneider, Werner, Parrot, Fluegel, Vogl (1906), Bridges (1914), and a centenary volume of essays collected and edited by Professor Little (1914). For the popular conception of Friar Bacon as a magician associated with Friar Bungay, see Greene's play (edited by A. W. Ward) and Sir John Sandys in the centenary volume.

Bacon Beetle. See DERMESTES.

Bacsanyi, JÁNOS, a Hungarian poet, was born 11th May 1763, at Tapolcza. His first work, published in 1785, procured him an appointment in a public office, but a liberal poem cost him this in 1793, as well as his liberty the year after. In 1796 he came to Vienna, and there he married a few years later, unhappily. In 1809 Bacsanyi translated Napoleon's proclamation to the Hungarians, and was afterwards obliged to take refuge in Paris. After the peace of Paris he lived at Linz, and there he died, 12th May 1845.

Bácska, or BAČKA, a region of the Vojvodina in Yugoslavia, between the Danube and the Theiss, till 1920 a county of Hungary (Bács-Bodrog). The land is low and marshy, and very unhealthy, but of great fertility. It produces the best wheat; and wine, tobacco, and cattle are also exported. The capital is Zombor (q.v.). The people are Serbs, Germans, and Magyars. A small strip in the north remains Hungarian.

Bacteria (plural of late Lat. *bacterium,* Gr. *baktērion,* dimin. of *baktron,* 'stick,' 'staff'). It is a familiar fact that if water which contains or has contained organic matter either of animal or vegetable origin be left to itself, it soon becomes cloudy and covered with a film. If the floating flakes or surface scum be examined with the high power of a microscope, a marvellous exhibition of the lowest forms of life is presented. Representatives of the simplest animals, such as Infusorians, will probably be seen, and in some cases also some of the lowest single-celled plants, but all these will appear as giants amid a crowd of dwarf organisms, most of which are Bacteria. These usually appear as minute spheres, rods, or threads, propelled along by delicate lashes, or quivering together with the usual tremulousness of very small floating particles, or lying more passively entangled in a jelly-like flake. In a short time it will be seen that these bacteria multiply with extraordinary rapidity by cross-division; one soon becomes a thousand, and the minute specks which first appear may, if the water contains enough food, soon form a mass filling the vessel. Wherever organic matter is in process of decomposition, in infusions as above indicated, or in disease or death, or within the living and healthy organism, there these bacteria are to be found.

So abundant are they, that in spite of their minuteness they did not escape the enthusiastic observation of the early workers with the microscope. Thus, in the 17th century, and with the comparatively imperfect microscope of those days, Leeuwenhoek described some of these low organisms. In 1773 O. F. Müller established two genera, Monas and Vibrio. Not much progress was made, however, till about 1838, when Ehrenberg and Dujardin included bacteria in their investigation of minute organisms. They referred the forms which they described to the animal series among Infusorians, and united a large number under the general title *Vibrionia.* Nor was this reference surprising, since naturalists had hardly begun to realise that animals have no monopoly of the power of movement, and since the mode of nutrition in bacteria is obviously very different from that of ordinary green plants. Gradually, however, it began to be clearly seen that in their structure and life-history bacteria are allied to the simple fungi, though this was not generally admitted until after the work of Cohn (1853) and of Nägeli (1857).

The bacteria or schizomycetes may be defined as extremely small, usually single-celled fungoid plants without chlorophyll, remaining single or united in loose colonies, reproducing rapidly by cross division or by the formation of spores, often occurring in myriad crowds enveloped in a jelly-like secretion, or separately with the power of energetic movement by means of flagella. As regards the mode of nutrition, three groups may be distinguished—(*a*) saprophytic forms living on dead organic matter, and producing decomposition and fermentation; (*b*) parasitic forms living directly on the tissues of their host; and (*c*) 'prototrophic' forms which require no organic food, being able to find their carbon-supply and nitrogen-supply in inorganic substances, such as carbon dioxide and ammonia. It is also important to notice that while many bacteria can only live in presence of free oxygen, others derive their oxygen from the organisms or decomposing media on which they live—a distinction which Pasteur expressed by the two terms, aerobic and anaerobic.

Terminology.—The term micro-organism is convenient as a general word, especially when the position of the form in question is still undetermined. The French word microbe, introduced by

Sédillot in 1878, has been approved by Littré, and is very widely used. It means a small living organism, and was invented to avoid dispute as to the plant or animal nature of low organisms like bacteria. It is now virtually equivalent to the latter. Bacterium is, like bacillus, properly the name of a distinct genus of schizomycetes, but the generic titles have both been too indiscriminately bestowed to be of much use, and are better restricted to popular designation.

The physiological significance of bacteria in relation to disease and fermentation will be the special subject of the article GERM THEORY. The present article has to do with the following points only—(1) distribution; (2) form and structure; (3) life-history; (4) general classification; (5) more important forms; (6) work of bacteria; and (7) the methods of research.

I. *Distribution.*—Bacteria are found practically everywhere—in air, water, and soil; in the mouths of men as well as on the walls of their houses; on the hair of the head and the toes of the feet; in chalk and coal; in food and drink; but especially where there is disease, death, or decomposition. To speak of the 'omnipresent bacillus' is hardly an exaggeration.

(*a*) *Air.*—Bacteria are often abundantly present, especially as spores, in the air, and particularly so in the vicinity of human dwellings and the like. Winds from crowded quarters, hospitals, slaughter-houses, &c., often carry myriads of microbes; but pure air from the polar regions contains hardly any. It cannot be too strongly emphasised that fresh air and sunlight are the most effective antagonists of our subtle enemies. Sunlight is rapidly fatal to some of the most virulent pathogenic species—e.g. the germs of anthrax and typhoid fever. It acts independently of the temperature, it is abetted by oxygen and moisture, and it doubtless kills by some chemical action, since the blue-violet and ultra-violet rays have the strongest 'bactericidal' effect. This healthful influence of light has begun to be directly utilised in medicine—e.g. in the cure of lupus. Statistics appear to show that the maximum abundance of bacteria in the air is in autumn, the minimum in winter; and that the number rises in times of drought and is reduced by heavy rainfall.

(*b*) *Water.*—Even pure water contains many bacteria, and always more than occur in air. The minimum occurs in condensed water-vapour (900 to the litre), the maximum (80 millions per litre, 1¾ pint) of course in sewer water, especially if there be the least stagnation. If there be a proper flow of water, however, the germs never become dry enough to be floated in the air, and are not therefore dangerous. The sulphurous springs of the Pyrenees contain an abundant bacterium (*Beggiatoa*), which accumulates sulphur in its cell, and is especially abundant in the floating scum known as glairine or barégine (see BARÉGINE). Some bacteria, often called chromogenic (or colour-making) on account of their bright pigment, occur in water under certain conditions, and have given rise to superstitious accounts of 'blood-rain.' The red colour of stagnant pools in autumn has been known for fifty years as the result of a micro-organism, described by Ehrenberg as *Ophidomonas sanguinea*, but now known as a species of *Spirillum*. It rapidly changes from green to red, and if a waterspout draw up and re-discharge the bacterium-laden water, a shower of 'blood-rain' is no longer mysterious. Snow is sometimes coloured in a varied way by the presence of a similar organism (*Micrococcus*); which is not, however, to be confounded with the much larger *Protococcus* of 'red snow.' Bacteria are abundant in the shore-area, and also in the superficial layers of the ocean, where they play an important part in the economy of marine life. So far as we know, they are absent from the great abysses of the deep sea.

(*c*) *Soil.*—Nor is soil free from bacteria. Spring-water fresh from the source carries a cargo of these micro-organisms. Pasteur found that the germ of splenic fever (*Bacillus anthracis*) occurred in great abundance in the earth round about the pits in which diseased cattle had been buried. He also found bacteria in the earthy excrement of worms. Some refer the origin of most epidemic diseases to the ascent of these deadly germs from the soil; and if this be in any way true, the danger of drying marshes, of narrowed river-beds, and of dust generally, is obvious enough. Some striking researches by M. Béchamp go to show that bacteria may lie dormant in soil for an incalculable period. A fresh piece of chalk taken from the quarry, with due care to exclude extrinsic germs, gave rise to abundant bacteria. He also discovered their presence in coal, but was unable to bring the sleeping germs into life again. It may be noted here that there is good direct evidence of the presence of bacteria in Carboniferous and Devonian deposits.

(*d*) *Food, &c.*—The rancidity of butter, the putrefaction of cheese, the game-flavour and high odour of meat, the yellowness and blueness of milk kept in imperfectly scalded vessels, the excessive staleness of bread, and a crowd of other unhealthy conditions in food, are largely due to the presence of bacteria. Bloody stains on bread, meat, paste, &c., have also been traced to the presence of a brightly coloured micrococcus. In the same way the bitterness, ropiness, &c. of bad wine are due to the same organisms.

(*e*) *In Association with Living Organisms.*—Bacteria are usually absent from healthy tissue, but they are generally present in the alimentary canal, and may assist in the decomposition of food-stuffs. They are also abundant in the pitchers of pitcher-plants, again to the advantage of their host. The micro-organisms which cause root-tubercles on leguminous plants, and are somehow able to utilise free nitrogen, are the most striking examples of directly useful bacteria. But besides the directly useful symbiotic forms, and others whose presence is indifferent, there are many which cause disease, usually by producing poisons or toxins. The counteracting of these poisons by the artificial introduction of 'anti-toxins,' as in the case of diphtheria, is one of the most notable features of modern medicine. We may here notice that the disease-producing bacteria are found free in a great variety of circumstances—in water (e.g. bacillus of typhoid, spirillum of cholera), in the soil (e.g. germs of tetanus and quarter-evil), in air (e.g. bacillus of tubercle and anthrax), and in food, such as milk (e.g. germs of tubercle, typhoid, diarrhœa).

II. *Form and Structure.*—As regards the shape

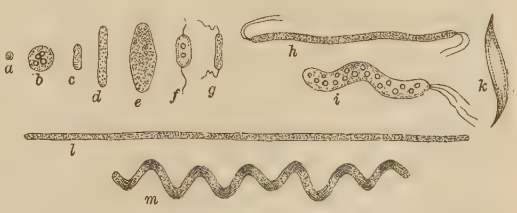


Fig. 1.—Different Forms of Bacteria (after Zopf):
a, Micrococcus; *b*, Macrococcus; *c*, Bacterium; *d*, Bacillus; *e*, Clostridium; *f*, *g*, *h*, *i*, ciliated phases; *k*, Spiromonas; *l*, Leptothrix; *m*, Spirillum.

of the individual units, four principal forms may be distinguished—viz. spherical, elliptical, rod-like,

and spirally curved. It must be noted, however, that a bacterium may, as Lister and others have shown, pass from one form to another in response to different physiological conditions, that a species spherical in its young stages may be elliptical or cylindrical afterwards, or that a rod-like form, such as *Bacterium lactis*, which causes lactic acid fermentation, may become thread-like or spiral when sown in urine.

Bacteria do not, however, remain single, but reproduce by division, and the results of division may remain loosely united. (1) The spherical micrococcus and the elliptical or cylindrical bacterium always divide in one direction, and the resulting couple may remain temporarily united, or continue multiplying to form a myriad colony embedded in a jelly (zooglœa). (2) In Bacillus, Leptothrix, and Beggiatoa, the cells may form long cylindrical threads, and this is varied in Vibrio, Spirillum, and Spirochæte by the development of spiral or wavy curvature. (3) In Sarcina, again, the division takes place in three planes, and the result is obviously the formation, not of long chains,

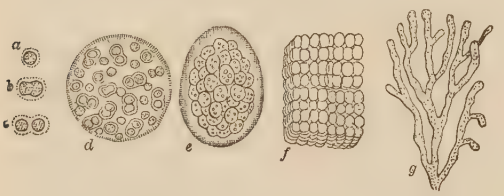


Fig. 2.—Multiplication of Bacteria (after Zopf):
a, *b*, *c*, division of Coccus (Crenothrix); *d*, round zooglœa of the same; *e*, oval zooglœa of Beggiatoa; *f*, cubical packets of Sarcina; *g*, ramified zooglœa of Cladothrix.

but of cubical clumps. In the group known as Trichobacteriaceæ, e.g. Crenothrix and Cladothrix, the typical form is a branched or unbranched filament, segments of which separate off as swarm-cells.

Structure.—The unit mass of protoplasm which forms the bacterium individual is always inclosed in a membrane, which sometimes consists of the cellulose characteristic of the cell-walls of plants, but more frequently of a peculiar albuminoid substance which has been designated mycoprotein. This membrane may be stiff or flexible, colourless or brightly pigmented, and undergoes uniform increase in thickness. The contained protoplasm consists largely of the above-mentioned mycoprotein, and may include fat-like granules, particles of pure sulphur, grains of starchy material, and dissolved pigment often of a brilliant colour. Some of the bacterial pigments are physiologically important—e.g. bactero-purpurin, which enables its possessors to absorb rays of solar energy. In some cases—e.g. tubercle bacillus—there may be cellulose in the cell-substance, and also in the swollen cell-walls of the zooglœa stage. A few forms show a more or less typical nucleus, but in the great majority it is either absent or represented by diffuse nucleoplasm or by several chromatin granules. In most bacteria, at some stage at least, there are locomotor cilia or flagella, which issue through pores in the wall. There may be one, or two, or a tuft, or many. It is difficult to convey any idea of the minuteness of most bacteria. A large number may be lifted on the point of a needle. A micron (μ) is ·001 of a millimetre; bacteria vary from 0·3 to 3 μ. The blood-red spheres of *Micrococcus prodigiosus*, sometimes seen on bread, are 0·0005 mm. in diameter.

III. *Life-history.*—It is convenient to distinguish in the life-history three important events or processes—(*a*) increase in size and modification of form; (*b*) reproduction; (*c*) the assumption of the resting form known as zooglœa.

(*a*) *Increase in Size and Modification of Form.*—As the result of abundant nutrition, the bacterium unit increases in size, and this growth necessitates division, and is associated with change of form. The minute spherical cocci usually grow into rod-like or cylindrical shapes, and these little rods divide rapidly, ranging themselves in rows to form filaments. In those filaments the original distinctness of the component units is often lost. Nutritive and other conditions, however, affect the form, both of the separate rods and of the composite filaments. Both exhibit a tendency to be more or less spirally curved. Thus wavy forms arise from the straight, and their history shows that the longer forms arising from rows of straight rods are really multicellular, whether they appear to be so or not. This modification of form is technically known as the pleomorphism of bacteria.

(*b*) *Reproduction.*—The more complete the degree of parasitism in fungi, the more probable is the absence of sexuality. In bacteria, the multiplication is an entirely asexual process. The absence of anything of the nature of sexual union may perhaps in part explain the infinitesimal minuteness of the individuals; and again, since the bacteria live to a certain extent bathed in waste products, the stimulating character of the medium has been regarded as a physiological substitute for the stimulus to division usually supplied by fertilisation. The process of multiplication which invariably occurs is by means of division. The coccus or rod-like form becomes somewhat elongated, a double partition wall is developed in the middle, and the two daughter cells are thus formed.

Besides this external and successive fission, another process is frequently observed in which the divisions occur in a less definite way. Spiral or other forms are seen to divide rapidly into fragments, either at once externally, or at first only internally. The rupture of the flexible filament occurs in the more passive middle portion, and each half again splits, and so on. The liberated fragments grow again to the adult size.

Another mode of reproduction is spore formation. Around a minute granule in the mother cell the protoplasm gathers and acquires a wall, or there may be several spores within one cell. As these 'endo-

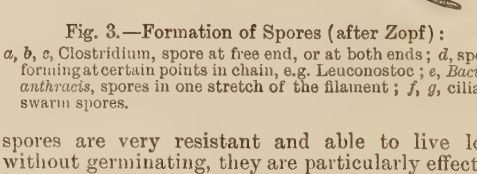


Fig. 3.—Formation of Spores (after Zopf):
a, *b*, *c*, Clostridium, spore at free end, or at both ends; *d*, spores forming at certain points in chain, e.g. Leuconostoc; *e*, *Bacillus anthracis*, spores in one stretch of the filament; *f*, *g*, ciliated swarm spores.

spores are very resistant and able to live long without germinating, they are particularly effective in securing the persistence and dissemination of bacteria. When the protoplasm of an ordinary vegetative cell rounds itself off and passes into a resting stage, this is sometimes, but unfortunately, called an 'arthrospore.' Spore-formation appears to set in as a response to insufficient nutrition, as is the case in very many instances of reproductive activity. The liberated spores germinate and develop into the adult forms. Often ciliated in their young stages, they become more quiescent with increasing size. It should be clearly recognised that bacteria really *multiply* by division, and that spore-formation is a specialised mode of reproduction, occurring

in conditions unfavourable to vegetative growth, and often effective in insuring survival when the ordinary forms die, or in securing dissemination from one place or host to another.

(*c*) *Formation of Zooglœa.*—Wherever bacteria have been allowed to flourish unmolested, jelly-like flakes or clumps are found. These were formerly regarded as distinct forms and called zooglœa, but they are now recognised as a phase in the life-history. Such gelatinous clumps are often conspicuous both in size and colour; thus that of *Clostridium polymyxa* may measure more than an inch across, while the 'frog-spawn' zooglœa occurring not unfrequently in the beetroot juice used in sugar manufacture, may attain a size of more than a foot. These zooglœæ consist of myriad colonies of bacteria embedded in a jelly.

IV. *Classification.*—A thorough classification of bacteria has yet to be elaborated. The multitude of forms differing in comparatively trivial points of structure, the insufficient state of our knowledge of the life-history of many genera, the difficulties involved by the abundant pleomorphism, the existence of weighty physiological differences between forms which seem otherwise absolutely alike, make a dogmatic classification at present quite impossible. In 1838 Ehrenberg distinguished four genera—(1) *Bacterium*—straight and rigid; (2) *Vibrio*—snake-like and flexible; (3) *Spirillum*—spiral and rigid; (4) *Spirochæte*—spiral and flexible; while Dujardin united the two last into one genus. In 1872 Cohn, to whom so much progress in bacteriology has been due, distinguished four distinct tribes—(1) Sphærobacteria—globules (*Micrococcus*); (2) Microbacteria—short rods (*Bacterium*); (3) Desmobacteria—long rods (*Bacillus* and *Vibrio*); Spirobacteria—spirals (*Spirochæte* and *Spirillum*). This classification held ground for a few years, but has been abandoned for a reason which must already be obvious. In 1873 Lister was the first to hint at the fact of pleomorphism. He showed that certain forms referred to different genera and groups were really phases in one and the same life-cycle. The mistake had been made of separating young and adult stages, and of regarding as permanent and fundamental shapes and habits which were only temporary and transitional. Till the life-history of all the forms is completely known, the same mistake in this, as in other departments, is sure in some degree to persist. What Lister suggested was in the same year even more conclusively demonstrated by Lankester. Forms belonging to different groups of Cohn's classification were shown to be successive chapters in the life-history of one species. The researches of Billroth (1874), Klebs (1875), Nägeli (1877), Warming, and others, but most of all, perhaps, of Zopf, have established the prevalence of pleomorphism, and have made this fact at least certain, that whatever the final classification is to be, it must be one which takes account, not of specific facts of form, but of the whole round of the life-history, and of the sum-total of morphological and physiological properties. A commonly adopted classification is that of Fischer. He distinguishes three groups: (1) Haplobacterinæ; (2) Trichobacterinæ; (3) Myxobacterinæ.

Fig. 4.—Different Phases of one Form—*Cladothrix dichotoma* (after Zopf):

a, branched form; *b*, one twig of the same; *c*, a small portion of a twig; *d*, this breaking up; *e*, *f*, *g*, progressive division into little rods, and then into cocci.

(1) The unicellular forms or Haplobacterinæ include (*a*) the spheroidal Coccaceæ, e.g. *Micrococcus*; (*b*) the rod-like Bacillaceæ, e.g. *Bacillus*; and the curved Spirillaceæ, e.g. *Spirillum*.

(2) The Trichobacterinæ include branched or unbranched filamentous forms, whose segments separate as swarm-cells (gonidia).

(3) Quite peculiar are the Myxobacterinæ, which form plasmodium-like masses and peculiar spore-forming cysts.

Another feature that may be emphasised is the way in which spores are formed. In arthrosporous bacteria, the ordinary vegetative cells become thick-walled, and as such converted into spores, e.g. *Leuconostoc*. In endosporous bacteria the spores are formed inside the cells, and invested in walls of their own, e.g. *Bacillus*.

V. *Important Forms.*—More than seven hundred species of bacteria have been recorded, and the list is being added to every year. It is also highly probable that new species are at present being evolved. It is not possible here to do more than refer to a few important forms. Streptococcus is a genus with numerous species, some associated with disease in men and animals—e.g. with diphtheria, yellow-fever, foot-and-mouth disease—others merely feeding on the results of pathological processes, and a few entirely unassociated with diseases of animal life. Micrococci have been observed in cases of scarlatina, measles, whooping-cough, typhus, &c., but their precise rôle is not certainly determined. Hydrophobia is believed by many to be due to the presence of a micro-organism, and micrococcus has been observed in this connection. Many micrococci are apparently simply saprophytic, following and not causing pathological processes. *M. amylivorus* has been described as the cause of 'fire-blight' on pear-trees and other plants. Many of these forms are brightly coloured, as, for instance, that species which causes the blood-red sweat in the human armpit and elsewhere.

Species of bacterium have been found associated with pneumonic disease, diphtheria, &c.; others cause fowl-cholera and other diseases of animals; and a large number have been described apart from any directly pathological connection. *Bacterium prodigiosum* forms blood-red zooglœa, and occurs on bread, paste, milk, and the like. *B. aceti* oxidises the alcohol of wine and other fruit-juices into vinegar. *B. termo*, which is so often described as an almost omnipresent organism, is apparently only a phase in the life-history of many different forms. A species of Spirillum is believed to be the cause of relapsing fever, and Koch has described another form—the Comma bacillus—which he has found associated with Asiatic cholera. A large number of species are known apart from disease. The frog-spawn fungus, otherwise known as *Leuconostoc mesenteroides*, is of some importance, since it sometimes invades and corrupts the beet-root juice and molasses used in sugar manufacture. Bacillus is a large genus with numerous formidable species associated with the diseases of men and animals. Such are the bacilli of leprosy, syphilis,

and typhoid fever, tuberculosis, splenic fever, glanders, swine fever, &c. The bacillus of 'blue milk,' of hay-infusion, and *Bacillus septicus* of putrid albuminous fluids, may be noted as examples of forms unassociated with disease. A species of Clostridium is the cause of the disease of cattle known as 'black leg' or 'quarter-evil.'

A species of Crenothrix with long filaments is sometimes abundant enough to stop up narrow water-pipes. Beggiatoa occurs in various forms in sulphur springs, on sea-water, on the surface of

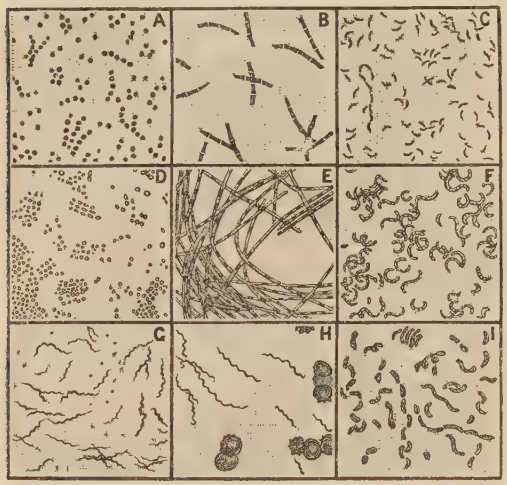


Fig. 5.—Different kinds of Bacteria (mostly after Koch): A, Micrococci, in drinking-water; B, in splenic fever; C, in cholera (Koch); D, from surface of water; E, in splenic fever (in thread-form, and with incipient spores); F, Spirillum, from putrefaction; G, Spirochæte, from the teeth; H, in relapsing fever, from blood; I, different forms of cholera microbe (Koch).

marshes, &c. The best-known species has a peach-blossom red colour. *Leptothrix buccalis* occurs abundantly in the mouth, and is apparently associated with the decay of teeth.

Cladothrix dichotoma (fig. 4) occurs more abundantly than any other in water containing organic matter. Various diseases of plants—e.g. hyacinths, cucumbers, and cabbages—have been shown to be bacterial.

VI. *Work of Bacteria.*—That bacteria are responsible for all sorts of organic decomposition or putrefaction was long ago established. They are the universal scavengers of our earth. Further research has shown that they play their part in various fermentative processes—e.g. in tanning, tobacco-curing, and ensilage. They have to do with various 'diseases' of milk and wine, and they are often deliberately used to improve the flavour of butter and cheese. Very often they produce poisonous ptomaines in the flesh of animals used for food, very often they simply increase its palatability. They are usually absent from normal tissue, but they are normally present in the alimentary canal, and are doubtless in many cases of real service. They may produce light—e.g. in the phosphorescence of dead fish; and they may produce heat enough to induce spontaneous combustion in hay-ricks or in hop-granaries. By decomposing cellulose certain anaerobic forms evolve marsh-gas in the stagnant pool; by oxidising processes other bacteria have assisted in forming deposits of bog-iron ore, ochre, and manganese ore. By producing often fatal 'toxins,' they have played a very important part as eliminative or selective agents in the history of animals and of man. In short, the work of bacteria is extraordinarily many-sided: they produce gas and solid deposits, acids and salts, ferments and toxins, heat and light, and are inextricably bound up with the bundle of life. (See the articles FERMENTATION, PUTREFACTION, PHOSPHORESCENCE, PTOMAINES; and for the germ theory of disease, GERM, ANTISEPTICS, ANTITOXIN.)

Of fundamental importance is the rôle they play in the circulation of matter. In the very simplest case, the agency of putrefactive bacteria brings about the decomposition of a dead animal, and the disruption of the nitrogenous materials yields ammonia, nitrates, and the like, which may be again utilised as food for plants. But the whole story of the chemical transformations which bacteria effect—a story still very imperfectly known—is extremely intricate. Thus there are *nitrosobacteria*, which can oxidise ammonia to nitrous acid and nitrites, which can in the dark build up organic matter from carbon dioxide and ammonia. There are *nitrobacteria*, which can oxidise nitrites and produce nitric acid and nitrates. There are *denitrifying* bacteria which change nitrates into nitrites, and nitrites into ammonia and free nitrogen. And there are other bacteria which live in partnership with the roots of leguminous plants and fix the free nitrogen of the air. The way in which this is effected remains obscure. Nitrogen-fixation (q.v.) is the subject of a separate article.

Similarly, if we fix our attention on sulphur, we find that when bacteria decompose the cellulose of decaying plants in a swamp, carbon dioxide and marsh-gas are liberated; if there be calcium sulphate in the water the nascent marsh-gas induces the formation of calcium carbonate and sulphuretted hydrogen. The latter may be oxidised by sulphur-bacteria which store sulphur in their cytoplasm; this sulphur may be oxidised to yield sulphuric acid, and, in the presence of calcium carbonate, sulphate of lime may again result. Thus the circle is completed, and there are many of these circles.

We cannot close our reference to the work of bacteria without referring to the fact that they often work together, hunting, as it were, in couples —e.g. *Bacterium coli* and *B. denitrificans*—and accomplishing what neither could do alone. On the other hand, it is equally important to note that different bacteria are often antagonistic. This fact is at the basis of some of the modern methods for dealing with sewage (see SEWERAGE, FILTER). Even in the realm of the infinitesimally small there is a struggle for existence—between bacteria and bacteria, between bacteria and protozoa, between bacteria and the animal's bodyguard of phagocytes.

VII. *Methods of Research.*—Besides the usual apparatus of any well-equipped laboratory for the study of minute structures and organisms, a number of special appliances are required for the successful investigation of bacteria. Thus, since the intrusion of germs other than those which are the specific object of research is a constant danger, there must be some means for sterilising the tubes, tools, media, &c. This is generally done by means of a steam or hot-air steriliser, in which all the extrinsic germs are killed off. Incubators are also used for purposes of cultivation. The bacteria obtained in endless ways may be examined as they are, or stained with reagents to bring out the individual structure, or, since the life-history is all-important, left to grow, and watched at their successive stages. They used to be left in some sterilised fluid, such as broth, blood-serum, urine, milk, or Pasteur's fluid, and allowed to grow in test-tubes, or other vessels, plugged with cotton-wool. It is, however, exceedingly difficult to get a perfectly pure fluid medium, nor was it possible in such cases to isolate

the different kinds of bacterium which might be present. In view of this, Koch introduced the method of cultivation on sterile solid media. Sterile nutrient gelatine, or some such substance, is liquefied in a tube and inoculated with the bacteria in question. These are distributed through the fluid, which is then poured out on a plate of glass and left to solidify. The various bacteria can no longer move about and mingle with one another, but are fixed to one spot, where they develop. The resulting fixed colonies can thus be studied without confusion. Slices of sterilised potatoes are also very frequently used as solid media for the cultivation of bacteria. Finally to elucidate the relation of a micro-organism to a given disease, it is necessary not only to have obtained it from an organism suffering from the said disease, but it is imperative that some of a pure cultivation be introduced into a healthy organism, to see whether it does or does not cause the disease. The inoculation may be brought about by inhalation, or along with the food, or by injection in some form or other.

How such methods have, in the hands of investigators like Pasteur and Koch, resulted in discoveries of profound importance, not only to a scientific theory, but to the practical amelioration of life, will be discussed in other articles.

See ALGÆ, ANTISEPTICS, FERMENTATION, FUNGI, GERM THEORY, INFECTION, NITRIFICATION, PUTREFACTION, &c.; Klein's *Micro-organisms and Disease* (1886); Löffler's *History of Bacteriology;* and manuals of Bacteriology by De Bary (1887), Trouessart (1886), Crookshank (1887), Sternberg (new ed. 1896), Sims Woodhead (1891), Günther (3d ed. Leip. 1893), G. Newman (1899), Hueppe (trans. 1900), A. Fischer (trans. 1900), Muir and Ritchie (new ed. 1904), Bergey (1923).

Bactria, a province of the ancient Persian empire, lying north of the Paropamisus (Hindu Kush) Mountains, on the Upper Oxus. A northern branch of the same range separated it from the Sacæ, and it had Sogdiana on the north and Ariana on the south. It thus corresponded pretty nearly with the modern Balkh. Here many scholars locate the original home of the Aryan or Indo-European family of nations (see ARYANS). Its capital, Bactra or Zariaspa, was also the cradle of the Zoroastrian religion. Originally a powerful kingdom, it maintained its independence until its subjugation by the great Cyrus about 540 B.C., when it became a satrapy of the Persian empire. It was included in the conquests of Alexander, and formed a part of the kingdom of the Seleucidæ until the foundation, about 256 B.C., by Diodotus, of the Greek kingdom of Bactria, which extended to the Indus, and which after a long struggle was overthrown by the Parthians. Numerous coins with Greek legends have been found in the *topes* or burial-places to the north-east of Kabul. See also ASOKA and ALPHABET, and a history by H. G. Rawlinson (1913).

Baculite.

Bactrites, a genus of fossil Ammonoidea, with a straight shell, and indented but not ramified septa. The genus is characteristic of the Devonian.

Baculites, a genus of the family of Ammonoidea, differing from the true Ammonites (q.v.) in the perfectly straight form of the shell, which tapers to a point, and is either round or compressed. The species, like the other Ammonoidea, are all fossil. Baculites are characteristic of the chalk, and appear to have existed only towards the expiry of the period over which the existence of the Ammonoidea extended.

Ba'cup, a municipal borough and manufacturing town of Lancashire (since 1918 part of Rossendale parliamentary borough), 6 miles N. of Rochdale. Besides many churches of all denominations, the oldest dating from 1788, it has a mechanics' institute (1846, enlarged 1870), a market-hall (1867), a very large co-operative store, &c. Bacup was constituted a municipal borough in 1882. Cotton-spinning and powerloom-weaving are the staple industries; and there are also dye-works, brass and iron foundries, and vast stone quarries. Coal-mines are worked in the neighbourhood. Pop. (1798) 1426; (1861) 10,935; (1871) 17,199; (1881) 25,033; (1921) 21,256.

Badagry, a small port of Nigeria, on the Slave Coast. At one time it carried on a large slave-trade, and had 10,000 inhabitants. It was from this place that in 1825 Clapperton and Lander started on their expeditions to explore the African interior.

Badajoz', capital of the Spanish province of the same name, is built on a slight hill crowned by a Moorish castle, on the left bank of the Guadiana, crossed here by a stone bridge of 28 arches. It is but 5 miles from the Portuguese frontier, and is 174 miles from Lisbon, and 315 from Madrid. The see of a bishop, it has an old cathedral built like a fortress, with paintings by Cerezo and Morales. Its fortifications are obsolete; its monasteries have been secularised, and some of its nunneries closed. Its chief articles of manufacture are hats, soap, coarse woollens, leather, and pottery. It has also a large trade in cattle. Pop. 38,000. Badajoz was the *Pax Augusta* of the Romans, the *Bax Augos*, *Bathaljus* of the Moors. As one of the keys of Portugal, it has often been a place of importance in war. It was besieged in vain by the Portuguese in 1660, and again by the allies, in the Spanish War of Succession, in 1705. During the Peninsular war, Badajoz was besieged by the French in 1808, and in 1809, and again in 1811, when it surrendered, March 11, to Soult. It was thrice besieged by the English; first on April 20, 1811, next in May and June, and thirdly in the spring of 1812, when Wellington captured the city by storm, on the night of April 6, after a murderous contest, and a loss during the twenty days' siege of 72 officers and 963 men killed, and 306 officers and 3483 men wounded. There were two days of pillage, and deplorable excesses. The province has an area of 8450 sq. m.; pop. 645,000. See ESTREMADURA.

Badakhshan', a territory of north-east Afghanistan, has the chain of the Hindu Kush on the south, and the Oxus, or Amu Darya, on the north, includes Wakhan, on the Upper Oxus, between Badakhshan proper and the Pamir Steppe (see PAMIR, and the map at AFGHANISTAN), and forms a province along with Kataghan which lies to the west. It is drained by the Kokcha, a head-stream of that river, and is famous throughout the East as a picturesque mountain-country diversified with woods, rich pasture, and some fertile, well-cultivated valleys, its surface varying from 500 to 15,600 feet above sea-level. Eastern travellers speak with rapture of its orchards, its fruits, flowers, and nightingales. It is rich too in mineral wealth —rock-salt, sulphur, copper, iron, rubies, and pre-eminently lapis-lazuli. Some of the mountain-passes into India are among the highest in the world, passable only on foot, often snow-blocked and infested by Kafir robbers. Marco Polo was here in 1272–73. Faizabad (q.v.) is the capital. The inhabitants are mostly Tajiks, a Persian-speaking people. They are Mohammedans—Shiites in the mountains, and Sunnites in the plains. Their number is estimated at 100,000. The people of Badakhshan seem to have been always under the immediate rule of their own chiefs, with the Amir

at their head. They have generally, however, formed part of some great Asiatic empire. Thus, in the 18th century, Badakhshan belonged to the empire of Nadir Shah, after whose death it became subject to the Afghans. In 1823, however, the Uzbegs, under Murad Beg, taking advantage of the disturbed state of Afghanistan, defeated the tribes of Badakhshan in a pitched battle; and two years after, their subjection was completed. The conquerors treated them most harshly, demolishing their towns, and either selling them as slaves, or carrying them off to people the unhealthy swamps of Kunduz. On Murad's death in 1845, Badakhshan passed to another Uzbeg. The Afghans, however, soon reasserted their claims, and in 1859 were about to annex Badakhshan, when the Amir agreed to pay an annual tribute. In 1863 Jahander Shah, the Amir of Badakhshan, was superseded by Mahommed Shah. This gave rise to a struggle which ended in Jahander's nephews acquiring dominion by means of Afghan help. In 1873 Britain and Russia fixed a frontier between Badakhshan and Afghanistan. In 1881 an Afghan governor was appointed. Wakhan, which stretches eastward as a tongue of Afghan territory between India and Bokhara, is a lofty mountain land of shepherds and yak-keepers.

Badalona, a seaport in the Spanish province of Barcelona, 5 miles NE. of that town by rail. The fertile plain around is covered with gardens and orange-groves; the town has shipbuilding and a large glass-work. Pop. (1920) 29,361.

Badderlocks, also sometimes HONEYWARE or HENWARE (*Alaria esculenta*), an olive-coloured seaweed belonging to the *Phæophyceæ* (see SEAWEEDS), and allied to the common *Laminaria*, which grows on rocks in deep water on the shores of Britain, Iceland, and the northern parts of Europe. It has a short cylindrical stem with lateral spore-bearing processes, and a membranous olive-green frond of 2–12 feet long, with a stout midrib. This midrib, together with the 'fruits,' is eaten by the inhabitants of the sea-coasts of Iceland, Denmark, Scotland, Ireland, &c., and is said to be the best of the esculent algæ. The name is supposed to be a corruption of Balder-locks. See BALDER.

Baden, a free-state (formerly grand-ducal), situated in the south-western corner of the German commonwealth, between Alsace-Lorraine and Würtemberg, and separated from Switzerland by the Rhine. Its area is 5819 sq. m.—considerably less than that of Yorkshire.

Surface and Hydrography.—Physically, Baden falls into two divisions—the western plain, lying along the right bank of the Rhine, and the eastern highlands; the former occupying about a sixth of the whole duchy. Of the mountain districts, the Schwarzwald, or Black Forest (q.v.), is the most important, and attains a maximum altitude of 4903 feet. The Neckar highlands are lower, and north of the Neckar Valley the Odenwald begins. Southward rise the extensive plateaus of the German Jura. Being drained by the Rhine and the Danube, Baden belongs to the basins of two opposite seas; the sources of the Danube, however, drain only some 350 sq. m. From Basel to below Mannheim, the Rhine is the sole and the natural boundary. Its chief tributaries on the Baden side are the Neckar, the Murg, and the Elz. On the north-east the Baden territories are bounded by the Main. Except a part of the Lake of Constance, Baden has no lake of importance.

Produce.—As the difference between the highest and lowest points of Baden amounts to something like 4500 feet, there is naturally a great variety of temperature. The Rhine Valley of Baden is one of the warmest and most fruitful districts, not only of Germany, but of Europe. Grain, vegetables of all sorts, tobacco, hemp, rape, poppy-seed, &c. are grown, and a large quantity of wine is produced. The rearing of cattle is carried on to a large extent. Honey is also an important product.

Minerals.—The principal minerals are the products of the limestone quarries and of the clay and gravel pits, and gypsum, largely used for pavements. Coal, zinc, and manganese are found, and the production of salt and soda is important. Iron, lead, silver, and nickel were formerly wrought in the Black Forest, but the industry has become almost unprofitable, and now receives little attention. Baden is rich in mineral springs; as many as sixty are enumerated, and there are a great number of much-frequented watering-places, as Baden-Baden, Badenweiler, and others.

Manufactures, &c.—The manufactures of Baden include ribbons and cotton fabrics, paper, leather, rubber goods, chemicals, machinery, tobacco, chicory, sugar, beer, trinkets, mirrors, wooden clocks, and straw-plaiting; the last two are characteristic of the Black Forest, and known all over the world. The manufactures of jewellery in Pforzheim are the most important in Germany. The chief articles of export are wine and timber.

Population, Religion, Education.—The population of Baden in 1880 amounted to 1,570,196, and in 1925 it had increased to 2,312,462 (397 per sq. m.). Karlsruhe (pop. 145,694) is the capital. Other principal towns are Mannheim (247,486), Freiburg (90,475), Pforzheim (78,859), Heidelberg (73,034), Constance or Konstanz (31,252), Baden-Baden (25,692), Offenburg, Bruchsal, Durlach, Lörrach, Weinheim, Lahr, Villingen, Rastatt, and Singen (all above 10,000). The Roman Catholics in 1925 numbered 1,350,469; Protestants numbered 910.324; and Jews, 24,000. The school-system is excellent; and Baden has a Protestant university at Heidelberg and a Catholic university at Freiburg.

Government.—The Grand-duke Friedrich II. abdicated in November 1918, and Baden was proclaimed a republic. A constitution was drawn up in January 1919 by a National Assembly. The free-state of Baden was declared a component state of the German republic. All privileges of birth and sex were abolished. The legislature is elected, on the system of proportional representation, by universal suffrage. It elects the cabinet and its president who has the designation of state president. The referendum and initiative have been adopted. Religious instruction in schools is compulsory, but there is no state church.

History.—The earliest inhabitants of Baden known to history were the Alemanni. These fell under the dominion of the Franks, and the dukedom of the Alemanni was abolished in 748 by Pepin the Little In the 11th century, a Duke Berthold built the castle of Zähringen in Breisgau, and a descendant of his second son took the title of Margrave of Baden, and became the ancestor of the house that reigned till 1918 He died in 1130. The present capital, Karlsruhe, was built in 1715 by the margrave Charles III. It is to his grandson, Charles Frederick, who succeeded in 1746, that Baden owes considerable accessions of territory and political importance. By favouring the policy of Napoleon, and joining the Confederation of the Rhine, he doubled his possessions in extent and population, and acquired successively the dignity of elector and the title of grand-duke. In 1811 he was succeeded by his grandson, who, after the battle of Leipzig, seceded from the Confederation of the Rhine, and (1815) joined the German Confederation, in which Baden held the seventh rank.

The Grand-duke Charles granted (1818) the charter which formed the basis of the constitution. Charles was succeeded in the same year

by his uncle Ludwig, who was inclined to absolutism, and who, dying childless (1830), was succeeded by his brother Leopold. The known liberal tendencies of this prince promised at first a new life to constitutional rule; but the tide of reaction soon seized the government, and a fluctuating contest between a reactionary cabinet and a growing opposition was carried on till 1846, when the constitutional Bekk was made minister of the interior, and liberalism thus placed at the helm. The ninth parliament met (December 1847) under the most friendly and promising auspices; when the French revolution (February 1848) suddenly called the radical party into the most violent activity. Not satisfied with a multitude of liberal measures passed by the legislature, the revolutionary leaders, Hecker and Struve, aimed at establishing a republic, and stirred up an insurrection. The troops having sided with the insurgents, the grand-duke fled, and a Constituent Assembly was called (May 1849). The duke had recourse to Prussian aid, and after several battles, was reinstated on his throne (July 1849); but the reactionary tendency was less marked in Baden than in most other German states. In 1859 a great conflict between the state authorities and the Catholic hierarchy ended in favour of the latter; two years later a definite settlement recognised the complete independence of the church, a privilege extended also to the Protestant Church of Baden. In 1864 liberal reforms reorganised the administrative and judicial systems of the country. In the conflict between Prussia and Austria in 1866, Baden took her place with the enemies of Prussia, and her troops fought in two ineffective battles against the Prussians. At the peace, Baden had to pay a heavy war indemnity, reorganise her army on the Prussian model, and in 1867, enter the North German Confederation. In 1870–71 the troops of Baden fought with distinction in the French campaign, and the grand-duchy became a part of the restored German empire. The Old Catholics were afterwards recognised. The Grand-duke Friedrich I. (1826–1907) was succeeded by his son Friedrich II. (1907–18). The republic was set up in 1918. See GERMANY.

Baden, a town and fashionable watering-place in the Swiss canton of Aargau, on the left bank of the Limmat, 14 miles NW. of Zurich by rail. It has a population of 9000, and its sulphur-baths, which were known to the Romans as *Thermæ Helveticæ*, yearly attract some 20,000 visitors. Their temperature is as high as 117° F. Baden, from the 15th to the beginning of the 18th century, was the seat of the Swiss diet.

Baden-Baden, a town in the German land of Baden, situated in the pleasant valley of the Oos, at the edge of the Black Forest, 8 miles from the Rhine, and 23 SSW. of Karlsruhe by rail. Pop. (1925) 25,692; but its visitors during the season, which is at its height in July and August, are often four times the number of the settled population. It is chiefly celebrated for its medicinal springs, which were known in the time of the Romans, Baden-Baden claiming to have been founded by Hadrian in the 2d century A.D. Numerous Roman antiquities have been found in the neighbourhood, and are preserved in a museum here, and remains of a vapour-bath and dungeons of the same period were discovered in laying the foundations of the new castle. Its hot springs have a temperature of 115° to 150° F., are impregnated with iron, magnesia, and lime, with sulphuric and carbonic acids, and are especially recommended in gout, rheumatism, catarrh, and stomach complaints. They discharge in the space of 24 hours about a million litres of water. The chief spring is called the *Ursprung*. The reputation of Baden-Baden as a *bad* received an increase from the visit of a number of French emigrants in the end of the 18th century, and from 1804 the grand-ducal family did everything possible to make the place more popular. So early as 1815 the annual guests numbered about 2500, and from that time its fame as a fashionable resort yearly assembled from all parts of the world so many guests of such a class that in wealth, gaiety, and luxury Baden-Baden might vie with the capitals of Europe. The season lasts from May to September. Even the winter season, which was started in 1872, keeps quite a number of strangers there. The beauty of Baden-Baden has been largely due to its gaming-tables, once the most renowned in Europe, but closed with the rest of the licensed German gaming-houses in 1872; besides paying a rent of over £14,000, they used to devote a like sum yearly to the beautifying of the promenades and public gardens. To the tables was devoted part of the *Conversationshaus* (1824), now the principal resort of visitors, including magnificently decorated concert and ball rooms, and a restaurant. All around are carefully kept pleasure-grounds, leading on one side to the *Trinkhalle* (1842), or pump-room, with large frescoes on legends of the Black Forest. The water drunk at the pump-room is rich in lithium. The principal baths are the Friedrichsbad (1877, for men) and the Augustabad (1892, for women). There are theatres and a technical school. The drives and walks round the town are beautiful. The picturesque ruins of the 'old castle' still crown the summit of the Schlossberg, and command a magnificent view of the Rhine valley from Speier to Strasburg. Lower down the hill, and directly overlooking the town, is the 'new castle' (1479), destroyed, like the old, by the French in 1689, but restored, and until 1918 the summer residence of the grand-duke. There is an English church in the town, built in 1868, and a Greek chapel for Russian visitors since 1882. Excepting perhaps wood-carving, local industry is insignificant. The town was known to the Romans as *Civitas Aurelia Aquensis*. See besides the guidebooks, works named at MINERAL WATERS.

Baden bei Wien (i.e. 'Baden near Vienna'), a much-frequented watering-place of Austria, on the Schwechat, 16¾ miles S. by W. of Vienna by rail. It was the *Aquæ Pannonicæ* of the Romans, and is still famous for its warm mineral springs, which are visited during the season by many thousands. The springs are sulphurous, with much carbonic acid gas, have a temperature of 79° to 104° F., and are good for neuralgia, gout, and rheumatism. Fine bathing establishments were erected between 1848 and 1877. Pop. 22,000.

Ba'denoch, a Highland district in the south-east part of Inverness-shire, 45 miles long by 19 broad, bounded by Lochaber, Athol, Braemar, and Moray, and traversed by the Spey. It is much covered with forest, and is chiefly composed of gneiss rock, with a little granite. It was a lordship, held from 1230 by the eldest branch of the great house of Comyn, on whose forfeiture in 1306 Bruce bestowed it on his nephew Randolph. In 1371 King Robert II. gave it to his son, 'the Wolf of Badenoch,' on the failure of whose descendants it reverted to the crown, which, in 1452, granted it to the Earl of Huntly.

Baden-Powell. See POWELL.

Badge (etymology unknown, either from Lat. *bajulo*, 'I carry,' or connected with *badger*), a figure or emblem used, with or without a motto, as the distinctive cognisance of a family. Family badges, which originated in the infancy of heraldry, and continued in favour down to the 15th century or later, were sometimes taken from a

bearing in the family coat, and sometimes bore allusion to the owner's name, estate, or office. While the banner, shield, and jupon of the knight displayed his armorial coat, and the crest surmounted his helmet, the badge glittered on his standard and penoncelle, and on the sleeve, breast, or back of his retainer, and occasionally helped to decorate his armorial seal. Devices, otherwise analogous to badges, differed from them as belonging to individuals, not families. The *fleur-de-lis*, as the badge of the kings of France, dates as far back as the reign of Louis VII. (1137–1180). Of the English royal badges, which have varied much, a few may be enumerated. A star between the horns of a crescent appears on the great seals of Richard I., John, and Henry III., and a castle (allusive to his descent from the house of Castile) on that of Edward II. An ostrich feather was used by Edward III.; and the same cognisance was borne argent by the Black Prince, and ermine by John of Gaunt. None of the sovereigns of the house of Plantagenet were in the habit of using the *planta genista*, commonly known as the badge of that house; but a livery collar of broom pods with a white hart pendant appears in the portrait of Richard II. at Wilton. Of the famous rival cognisances of the houses of York and Lancaster, the red rose was first adopted by Henry IV. and the white by Edward IV. The Tudor sovereigns used the red and white roses variously united, per pale, quarterly, and one within the other. The thistle, as the badge of Scotland, seems to have been first used by James III.; and on the union of the crowns, the rose and thistle were used dimidiated and crowned. The royal badges of the United Kingdom as now in use (settled by sign-manual in 1801) are—a white rose within a red, crowned, for England; a thistle proper, crowned, for Scotland; a harp or, stringed argent, and a trefoil vert, for Ireland; and, on a mount vert, a dragon passant, wings expanded, and endorsed gules, for Wales. Among the best known badges of the English nobility are the crescent of the Percies, the buckle of the Pelhams, the bear and ragged staff of the Earls of Warwick, and certain intertwined cords known as knots, the forms of which have sometimes been suggested by the initial letter of the name or title of the bearer. In the Wake and

1, Wake and Ormond knot; 2, Lacy knot; 3, Bowen knot; 4, Heneage knot; 5, Dacre badge.

Ormond knot (fig. 1), it is not difficult to trace a *W* and two *O*s. The Bourchier knot, as seen on the tomb of Archbishop Bourchier at Canterbury, bears a resemblance to two *B*s, and the Stafford knot to two *S*s. The Lacy knot (fig. 2) contains within it a rebus on the four letters of the name 'Lacy.' As examples of the badges of two different families entwined by a knot and used by the descendants of both, are the badge of the Dacres (fig. 5), combining their own escallop-shell with the ragged staff of Neville; and that of Edward, Lord Hastings, uniting the garbe of the Peverells with the sickle of the Hungerfords.

It has been the usage of the Highland clans to appropriate certain plants, chiefly native, as their badges, common heath being the badge of the Macdonalds, bell-heather of the Macdougals, holly of the Mackenzies and Macleans, box of the Macintoshes and Macphersons, fern of the Chisholms, fir clubmoss or wild myrtle of the Campbells, &c.

The term badge is also applied to the distinctive decoration of an order of knighthood. Badges of this description are noticed at ORDERS OF KNIGHTHOOD, and in the separate articles on the more important; those of baronets in the article BARONET.

Marks of distinction used in party warfare, and devices adopted by clubs or associations, are sometimes in loose popular language called badges. Cockades are the subject of a separate article. See also DEVICE, HERALDRY.

Badger (*Meles*), a genus of carnivores of the *Mustelidæ* or Weasel and Otter family. The Skunks (*Mephites*), Sand-bears (*Arctonyx*), American Badgers (*Taxidea*), Ratels (*Mellivora*), &c., are closely related genera in the same sub-family as the Badger (*Melidæ*). Badgers, like the rest of the family to which they belong, are almost quite plantigrade—i.e. they walk on the whole

Badger (*Meles vulgaris*).

sole of the foot, and not merely on the fore part of it. The body is thus brought nearer to the ground than it otherwise would be from their length of limb. The lower jaw is locked into its socket in a very remarkable way, which explains their tenacious grip. The head is long, with a pointed muzzle; the tail short; the skin very thick, loose, and tough; the hair long. Both ears and eyes are small. The gait is slow, the habits nocturnal and solitary. There are five toes on each both of the fore and hind feet, and the feet are peculiarly adapted for digging and burrowing. A peculiar characteristic of the badgers is the possession of a bag beneath the tail, for the secretion of a peculiar substance, of a disagreeable odour, which is supposed to be of use in directing the sexes to each other in their solitary wanderings.—The Common Badger (*M. taxus* or *M. vulgaris*) is the only bear-like quadruped now found in the British Islands, and that only rarely. It is widely diffused over Europe and the middle parts of Asia. The colour is grayish brown, verging to red above and black beneath; the head white, with a longitudinal black band on each side; the body long but robust, in size about equal to that of a small fox, the hair coarse and reaching to the ground as the animal walks. The average length is 2 feet 6 inches, and the height at the shoulder 11 inches. It haunts the gloomy recesses of woods, or thick plantations on the sides of hills, and digs for itself 'a deep and well-formed domicile, consisting of more than one apartment, the single entrance to which is by a deep, oblique,

and even tortuous excavation.' In such an excavation as this, the animal sleeps during the day and through the winter. It uses its nose in digging, and scrapes with the fore-paws, flinging the earth as far back as possible, and when the accumulation is considerable, pushing it away by means of the hind-feet. The habits of the badger are extremely cleanly. It is one of the most perfectly omnivorous of animals, in a wild state as well as in confinement; fruits, roots, beech-mast, eggs, young birds, small quadrupeds, frogs, snails, worms, and insects, equally constitute its natural food. For the sake of the larvæ of wasps and wild bees, it even ventures to dig up their nests, its hide being impervious to their stings. It is often caught by digging, or by placing a sack in the mouth of its hole, when it is out at night. Dogs sent into the hole are often foiled by the earth which the animal throws back upon them, to block up their way, nor is it easy for a dog to contend with it, owing to the great strength of its legs and jaws. A barbarous sport, called badger-baiting, or *drawing the badger*, was formerly common, but has been prohibited by act of parliament since 1850. A badger kept in a barrel was assailed by dogs, and at last, yielding to superior numbers, was dragged out, upon which it was released, and allowed to go back to its den, to recover itself, and be baited again, which happened several times daily, when the badger was kept as an attraction to a public-house of the lowest sort. The verb to *badger*, expressive of persevering annoyance by numerous assailants, was originally employed with reference to this practice. The flesh of the badger is said to be very agreeable, particularly when cured like hams. It is usually fat, like that of most sluggish heavy animals. In China it is much used for food. The badger is easily domesticated when taken young, and becomes very tame. In Scotland and the north of England, a badger is still called a *Brock*, its Anglo-Saxon name, preserved in the name of some places; in some parts of England it is termed a *Grey*. The Indian Bhalú-soor (i.e. Bear-pig), or Sand-bear (*Arctonyx collaris*), closely resembles the badger, but is taller, and has a more hog-like muzzle, and a longer tail. Its habits and its food are very similar, and when attacked, it likewise defends itself with great vigour. It is chiefly found in hilly districts.—The American Badger, or Taxel (*Taxidea americana*), is a distinct, more carnivorous genus, differing in dentition and in some features of the skull. It chiefly preys on small animals, such as marmots, which it pursues into their holes in the sandy plains near the Missouri and the Rocky Mountains. In its pursuit of the smaller quadrupeds upon which it feeds, it enlarges their burrows, and renders some parts of the plains dangerous to persons on horseback. Its prevailing colour is hoary gray in winter, yellowish brown in summer, and under parts generally yellowish white; a white stripe runs from the nose over the forehead to the neck. The hair becomes not only very long but woolly in winter.—The burrowing powers of this animal are extraordinary. It sometimes makes burrows 6 or 7 feet deep, running under ground to a length of 30 feet. See Alfred Pease, *The Badger* (1898).

Badger Dog. See DACHSHUND.

Badghis, a region north of Herat, comprising the country between the Murghab and the Harirud rivers, as far northward as the edge of the desert. It lies just to the south of the boundary line between Afghanistan and the Russian territories, as defined in 1887.

Badía-y-Lablich, DOMINGO, an enterprising traveller, born at Barcelona in 1766. Early smitten with the love of travel and adventure, in 1801 he crossed to Africa, disguised as a Mussulman, under the name Ali-Bei. From his youth he had been a devoted student of Arabic, and his knowledge of the manners and customs of the people was so intimate that he could escape detection, while to make his conformity complete, he had even circumcised himself. His tact and talents gained for him such esteem that he was invited to the court of the emperor of Morocco. After a two years' residence in Morocco, he set out on a pilgrimage to Mecca, and travelled through Barbary, Greece, Egypt, and Syria, meeting everywhere a kind reception. At the holy city of the Moslems he took his part duly in all the solemn rites, and has the distinction of being the first Christian that had visited it since the institution of Islam. In 1807 he returned to Spain, attached himself to King Joseph, and was appointed in 1812 Prefect of Córdoba; but on the fall of Napoleon's power two years later, he was compelled to leave the country. He went to Paris, where in 1814 he published an account of his travels under the title *Voyage d'Ali-Bei en Afrique et en Asie*. His work was translated into most of the European languages. Four years after the publication, he set off on another journey to the East, but died in Syria, 30th August 1818.

Bad Lands. See MAUVAISES TERRES.

Badminton, the seat of the Duke of Beaufort in the south of Gloucestershire, 7 miles E. of Yate Junction. It is a stately Palladian edifice of 1682, with a fine park. From it have been named a kind of claret cup, and a game, a predecessor of lawn tennis, played with a shuttlecock instead of a ball. The 'Badminton Library' is a series of works on the principal sports.

Badrinath, a peak of the main Himalayan range, Garhwal district, United Provinces, India, 23,210 feet above the sea. A shrine of Vishnu stands on one of its shoulders at a height of 10,400 feet, about 56 miles NE. of Srinagar. This temple overhangs a sacred tank, supplied from a thermal spring. As ablution in these waters is held to cleanse from all past sins, Badrinath is a grand resort of pilgrims, and a number of villages have been assigned for the support of the temple.

Bæda. See BEDE.

Baedeker, KARL, a German publisher, born in 1801 at Essen, where since 1797 his father had carried on the business of printer and bookseller. He himself started in business in 1827 at Coblenz, and died, 4th October 1859. He is best and everywhere known as the originator of a series of admirable guidebooks. With Murray's 'Handbooks' for their pattern, the German works, in the course of successive editions, have been so improved and entirely rewritten, that they have come in most essentials to equal, and in some to surpass their models; and now the guides are published in the principal languages of Europe. The business was removed in 1872 to Leipzig, carried on under the son of the founder. The first guidebook published by Karl Baedeker was a small book on the Rhine, of which in 1839 he produced a third edition entirely rewritten by himself. In the 20th century 'Baedeker' had become a synonym for guidebook, and there are Baedekers not merely for the principal European countries, but for Palestine and Syria, Egypt and Sudan, the United States, and Canada.

Bael, or BHEL. See ÆGLE.

Baëna, a Spanish town 25 miles SSE. of Córdoba, with a trade in grain and oil. In the castle here, Pedro the Cruel murdered the Moorish king of Granada with all his train. The castle belonged to Gonzalo de Córdoba. Pop. 18,000.

Baer, KARL ERNST VON, a distinguished

naturalist, who contributed very largely to the progress of natural science, especially of embryology, was born 29th February 1792, at Piep in Esthonia. In 1810–14 he studied medicine at Dorpat, in 1814 comparative anatomy at Würzburg, and in 1817 he went to Königsberg, where, two years after, he became professor of Zoology, and was charged with the organisation of the zoological museum. In 1834 he was called to St Petersburg, and was soon one of the most active members of the Academy. In 1837 he visited Novaya Zemlya, and in 1851–56 he devoted much time and study to the fisheries on Lake Peipus, the Baltic, and the Caspian Sea, publishing a large work thereon, and suggesting many improved methods. He specially applied himself to embryology; and to his laborious investigations we owe most valuable discoveries in regard to the development of animal life. Beginning with his *Epistola de Ovi Mammalium et Hominis Genesi* (Leip. 1827), he still further elucidated this subject in a great work on development of animal life from its first germ (*Entwickelungsgeschichte*, 1828–37–88), and one on the development of fishes (1835). In 1864 the fiftieth year of his doctorate was celebrated by the Esthonian nobility, at whose expense a splendid volume was published, containing Baer's autobiography. He died 28th November 1876. His works are distinguished by lucidity as well as keen observation and brilliant speculation.

Baeyer, Adolf von (1835–1917), organic chemist, born at Berlin, was a pupil of Bunsen and Kekule, became professor at Strasburg in 1872, at Munich in 1875. An influential teacher, he did much research, notably in the synthesis of indigo.

Baeza, a handsome old town of Spain, in the province of Jaen, 9 miles from a station of its own name, this being 160 miles S. of Madrid. The *Beatia* of the Romans, and the seat of Moorish khalifs and kings, with 150,000 inhabitants, it never fairly recovered from its sack by the Castilians in 1228. Its principal buildings are the quondam university (1533) and the oratory of St Philip de Neri. Pop. 15,000.

Baffa. See Paphos.

Baffin, William, navigator and discoverer, is believed to have been born in London about 1584; but the earliest known fact regarding him is that he sailed in 1612 as pilot of the *Patience* from Hull, on a voyage of discovery to Greenland. In 1613–14 he served in the Spitsbergen whale-fishery, and he wrote an account of this and his previous voyage. In 1615 he took service with a company as pilot of the *Discovery* in search of a North-west Passage, and made a careful examination of Hudson Strait; his recorded latitudes and notes of the tides are in remarkable agreement with those of a later date. In the following year, with Captain Bylot, he discovered, charted, and named Smith's Sound, and several others, and explored the large inlet now associated with his name. Later investigation has confirmed his descriptions. His latest voyages, 1617–21, were to the East. At the siege of Ormuz, which the English were helping the Shah of Persia to recover from the Portuguese, he was killed by a shot, 23d January 1622. See *Voyages of William Baffin, 1612–22*, edited by C. R. Markham (1880).

Baffin Bay, a gulf, or rather sea, to the north-east of North America, between Greenland and the great islands NE. of Hudson Bay (one of which is called Baffin Land), in 68° to 78° N. lat. It is about 800 miles long, with an average breadth of 280. The shores are for the most part lofty and precipitous, backed by ranges of snow-clad mountains. Baffin Bay communicates with the Atlantic Ocean by Davis Strait; and with the Arctic Ocean by Smith Sound on the north, and Lancaster Sound on the west. Baffin Bay, discovered in 1562, was first explored in 1616 by Baffin (q.v.). Baffin Land (or Island), to the W. and S. of the Bay, is a vast and barren insular tract in the Canadian district of Franklin, with an area of some 235,000 sq. m. The NW. part is Cockburn Land (formerly called Cockburn Island). There are two large lakes in the south, Amadjuak and Nettilling. The finding of coal and gold led the Canadians to send an exploring expedition in 1913.

Bagamoyo, a village on the coast of Tanganyika Territory, opposite the island of Zanzibar, famous as a caravan starting-point.

Bagaria. See Bagheria.

Bagasse, also called Cane-straw or Cane-trash, is the refuse left after expressing the saccharine matter from the cane in making Sugar (q.v.).

Bagatelle (Fr. 'a trifle'), a game somewhat resembling billiards. A bagatelle-board is usually about 7 feet long and 21 inches broad; it is of slate, and is lined with cloth and cushioned. The game is played with nine small ivory balls and a cue or mace. The player's object is to put the balls down in nine numbered holes at the farther semicircular end of the board. The game is as old at least as 1819.

Bagdad (better *Baghdad*), the most famous city of the Moslem East, capital of 'Iraq, stands on both banks, especially the left, of the Tigris, about 500 miles from its mouth, in 33° 20′ N. lat. and 44° 23′ E. long., in a flat, treeless plain of considerable extent, which is dotted with the ruins of ancient buildings. The entire city was surrounded by a brick wall, 5 miles in circumference and 40 feet high, now for the most part broken down, and by a deep dry ditch; the two parts are connected by a bridge of boats, 220 yards long, and the communication is guarded by a citadel. There are four gates, the finest of which, bearing date 1220, has been closed since 1638. Bagdad has an extremely picturesque appearance from the outside, being encircled and interspersed with groves of date-trees, through which one may catch the gleam of domes and minarets; but it does not improve on closer inspection. The streets are narrow, crooked, unpaved, and dirty. British occupation, however, made a considerable difference. The houses have, in general, no windows towards the front, and are built of old, yellowish-red brick; but their interiors are often very gorgeously decorated. The vaulted ceilings, rich mouldings, inlaid mirrors, and massive gilding bring back to the recollection of the traveller 'the golden prime of good Haroun Al-Raschid.' The foundation stone of the university was laid in 1922, the first block opened in March 1924. Bagdad contains upwards of 100 mosques, though barely 30 of them are in use. These, together with the khans, bazaars, baths, the palace, and the citadel, are the only noticeable buildings in the city, whose public edifices, indeed, are meaner than those of any other oriental town of a like size. The domes and minarets, the earliest dating from 1235, are ornamented with glazed tiles and painting, in green and white.

The bazaars exhibit the produce of both Asiatic and European markets; but commerce has greatly decreased since Persia began to trade with Europe by way of Trebizond on the north and by the Persian Gulf on the south. Nevertheless, though no longer the chief emporium of merchandise between East and West Asia, Bagdad still carries on a considerable traffic with Aleppo and Damascus, and with Kermanshah in Persia, and has manufactures of red and yellow leather, silks, and cotton stuffs. Wool, dates, grain, galls, gum tragacanth, opium, carpets, skins and hides are exported. Of the 250,000 inhabitants, the greatest part are Turks and Arabs;

the remainder are native Christians, Jews, Armenians, Hindus, Afghans, and Persians. In summer, the heat is oppressive, ranging from 75° at sunrise to 122° F.; rain does not fall on more than twenty or thirty days throughout the whole year; but when the snows melt on the Armenian hills, the Tigris becomes a majestic, and often a destructive river. In 1831 an inundation destroyed one-half of the town, and several thousand lives. Natives and visitors seldom escape the 'Bagdad boil,' which attacks face, neck, hand, or foot. Cholera visits Bagdad periodically; in 1831, 4000 people perished daily for several days from its ravages. In 1870–1871 Bagdad suffered severely from famine. Since 1836, British steamers have plied on the Tigris between Bagdad and Basra; and here is one of the chief stations of the Anglo-Indian telegraph. In 1902 an irade from the sultan gave powers to a German company to construct a railway from Konieh to Basra, by Bagdad. Construction was pushed on during the Great War. See EUPHRATES.

Though in 1848 Rawlinson discovered here bricks bearing the name of Nebuchadrezzar, the historical city dates from the Abbaside Khalif Almansur (see KHALIF). In the 9th century it was greatly enlarged by Haroun Al-Raschid, and under his son, Al-Mamûn, it became the great seat of Arabic learning and literature, glory and romance. A hundred years later Bagdad was ravaged by the Turks. In 1277 the grandson of Genghis Khan, Hulaku, put an end to the old khalifate; but his descendants were expelled by Timur, who took the city in 1393. For near a century it was in the possession of a Turkoman dynasty. In the beginning of the 16th century Shah Ismail, founder of the Sufi dynasty in Persia (q.v.), made himself master of it. Now it became a bone of contention between Turks and Persians; and after a memorable siege, it was conquered by the sultan, Murad IV., in 1638. Nadir Shah vainly essayed to retake it in the 18th century, and it remained under the sway of the Porte till 11th March 1917, when it was occupied by the British under Sir F. S. Maude.

The original province of Bagdad, lying between Arabia and Persia, comprised most of the basin of the Lower Euphrates and Tigris, and included the greater part of ancient Mesopotamia and Babylonia. Though now mostly a barren wilderness, it was in ancient times carefully irrigated and luxuriantly fertile, the seat of mighty empires, and inhabited by industrious populations. Railways and irrigation works will doubtless restore it. The inhabitants are Turkomans, Armenians, Turks, Jews, Arabs, and Kurds. See ASSYRIA, BABYLONIA, CTESIPHON, EUPHRATES, NINEVEH, SELEUCIA, TIGRIS.

Bagehot, WALTER, English economist and journalist, was born at Langport in Somersetshire, in 1826. He attended school at Bristol, and in 1842 went to University College, London, where he graduated in 1848; afterwards studied law, and was called to the bar in 1852, but joined his father in his business of banker and shipowner at Langport. In 1858 he married a daughter of the Right Hon. James Wilson, founder of the *Economist* newspaper; and from 1860 till 24th March 1877, when he died in his native town, he was the editor of that important journal. Bagehot's literary activity began in 1851, when he was in Paris at the time of the *coup d'état*, and wrote seven letters to a London paper, justifying the policy of Napoleon. These letters were published after his death in the first volume of his *Literary Studies*. Besides some other works of minor importance, there appeared during his lifetime: *The English Constitution*, a book of great value, translated into several modern languages; *Physics and Politics*, a treatise published in the International Scientific Series, which applied to politics the theory of evolution (first ed. 1872); and *Lombard Street*, an invaluable work on the money-market (10th ed. 1892). In 1895 there were new editions of his *Literary Studies* (with Memoir by R. H. Hutton) and *Economic Studies*. Bagehot was a vigorous and brilliant writer, and a thinker of great acuteness and suggestiveness. While adhering to the current English type of thought, both in politics and economics, he was thoroughly independent in the formation and expression of his views, and was readier than most of his contemporaries to give weight to the historical and evolutionary side of things. In particular he recognised the limitations of the Ricardian economics, and considered political economy as a science not of rigorous laws, but of tendencies. See *Life* by Mrs Russell Barrington (1914), included also, along with Hutton's, in the *Works* (10 vols. 1915).

Baggesen, JENS, was born at Korsör in Sjælland, 15th February 1764. A student at Copenhagen, he made a reputation as a poet by his lyrics and *Comic Tales* (1785). He made a lengthened tour through Germany, Switzerland, and France, and from this time German was to him a second mother-tongue. In 1811 he was appointed professor of Danish Language and Literature at Kiel; but three years after he removed to Copenhagen, where he became involved in an unseemly strife with Oehlenschläger, and in 1820 he left Denmark, never to return, for he died at Hamburg, October 3, 1826, whilst on his homeward way. His most important work is his idyllic epic, *Parthenais oder die Alpenreise* (1804), which contains single passages of great beauty. Baggesen possessed little lyrical genius, though many of the poems are admirable. He was strong in satire, and maintained a powerful polemic against the extravagances of the German romantic poets. The sphere in which he shone most conspicuously was the serio-comic. His so-called 'humorous epic' of *Adam and Eve*, published shortly after his death, is a singular mixture of humour, pathos, and levity. His style is excellent, and in this respect the Danish language owes much to him. His German works fill 5 vols. (1836); his Danish, 12 (new ed. 1845–48). See his Life by his son (4 vols. 1849–56); and Clausen, *Jens Baggesen* (Cop. 1895).

Baghal, BAGUL, or BHAGUL, one of the Simla hill-states in the Punjab, India, on the south or left bank of the Sutlej, with an area of 124 sq. m. The population is about 26,000.

Baghche Pass, where the Baghdad railway, about 100 miles E. of Adana, tunnels under a branch of the Taurus Mountains, is probably the Amanides Pylai of Greek writers, connecting Cilicia with Syria.

Baghdad. See BAGDAD.

Baghelkhand, the collective name of a historical area of 14,706 sq. m., including Rewah (13,000 sq. m.) and eleven small states (varying from 13 to 501 sq. m.) under a political officer subordinate to the governor-general's agent for Central India. This area lies to the south of the districts of Mirzapur and Allahabad. Up till 1871 it was under Bundelkhand. The state of Rewah is rich in mineral products, the most paying being the coal from Umaria, and in forests. It has also some very fertile tracts. It contains Amarkantak, on the Maikala Range, 3000 feet above the sea, the beautiful source of the Nerbudda, one of the most sacred spots in India.

Bagheria, or BAGARIA, a town of Sicily, 8 miles E. by S. of Palermo by rail. It is beautifully situated at the base of the isthmus which separates the Bay of Palermo from that of Termini, and is surrounded by groups of palatial villas of the Sicilian nobility. Pop. 20,000.

Baghistan. See BEHISTUN.

Bagimont's Roll, the name given to a valuation according to which the ecclesiastical benefices of Scotland were taxed from the end of the 13th century to the Reformation. It took its name from an Italian churchman, Boiamond (or Bajimont) of Vicci, a canon of the cathedral of Asti in Piedmont, who was sent by the pope to Scotland in 1274 to collect the tithe or tenth part of all the church livings, for a crusade. Hitherto, the Scottish clergy had been taxed according to a conventional valuation called the *Antiqua Taxatio;* but Boiamond set this aside. The clergy protested, and in a provincial council held at Perth in August 1275, they prevailed upon Boiamond, by promises and money, to return to Rome, there to entreat the pope to modify the subsidy. But the pope refused. Boiamond returned to Scotland to complete a valuation roll of its benefices; but he died before the tax itself was wholly collected. No complete copy of Bagimont's Roll in its original shape is now known to exist. A contemporary manuscript of so much of the Roll as applies to the archdeaconry of Lothian is preserved at Durham. A copy of Bagimont's Roll, as it appears to have existed in the reign of King James V. (1513–42), is preserved in the Advocates' Library at Edinburgh, in a hand of the beginning of the 17th century. It is full of inaccuracies; and it omits all livings of less than 40 marks a year. It was printed in *Archæologia*, vol. xvii. (1813). See J. Robertson' *Concilia Scotiæ* (Ban. Club), I. lxv.

Bagirmi, or BAGHERMI, a country in Central Africa, bounded on the W. by Bornu and a portion of Lake Tsad, and with the powerful sultanate of Wadaï to the NE. Its area is estimated at about 20,000 sq. m. The surface is flat, with a gentle rise towards the north—its general elevation being about 1000 feet above sea-level. It is traversed and watered by the Shari and its affluents. The soil yields durra and millet, which the natives barter for tobacco, pearls, and cowry-shells. The population is now very sparse. Mohammedanism has been introduced among them, but gross superstitions still prevail. Dr Nachtigal describes the natives as of the Sonrhai type, of low stature and not of pleasant features. Though they wear almost no clothing, they are in many respects semi-civilised, having a regular government in the capital, Chekna, as well as a military system. The sultan of Wadaï took the capital in 1871, reducing the sultan of Bagirmi to a more complete state of vassalage to him. The country was first visited by Barth in 1852. By the Franco-German agreement of 1896, the region east of the Shari, including Bagirmi, became part of French Equatorial Africa.

Bagli'vi, GIORGIO, an illustrious Italian physician, born at Ragusa in September 1669. He studied at Salerno, Padua, and Bologna, and in 1692 went to Rome. Here, through the influence of his friend Malpighi, he was appointed professor of Anatomy at the college of La Sapienza, where he died in 1707. His work, *De Fibra Motrice*, is the foundation of the theory of medicine known as 'solidism,' which refers all diseases to changes in the solid parts of the body, and which claims that solids alone possess vital properties and can be the seat of pathological phenomena.

Bagnacavallo, an old town of Italy, still walled, and formerly noted for its strong castle, 11 miles W. of Ravenna. It contains a beautiful cathedral. Bartolommeo Ramenghi (1484–1542), the Bolognese painter, who is generally known as Il Bagnacavallo, was a native. Pop. 16,000.

Bagna'ra, an Italian town, on the Gulf of Gioja, 16 miles NE. of Reggio. Excellent wine is produced in the neighbourhood. Pop. 11,000.

Bagnères de Bigorre, a well-known French watering-place on the Adour, in the department of Hautes Pyrénées, is situated 1820 feet above sea-level, at the base of Montalivet, and at the entrance to the romantic valley of Campan, 13 miles SE. of Tarbes by rail. It serves as a summer school of Toulouse university. Pop. 9000. By the Romans it was known as *Vicus Aquensis Balnearia* or *Aquæ Bigerrorum.* It was destroyed by the Goths, but the fame of its waters survived. It has fourteen baths, the chief Les Thermes and Villa Théas, and above fifty springs (90° to 135° F.), recommended for diseases of the digestive and nervous systems. Woollens, linens, and *Barèges* (q.v.) are manufactured here, and there are marble and slate quarries.

Bagnères de Luchon, or simply LUCHON, a well-known Pyrenæan watering-place of France, in the department of Haute Garonne, in the beautiful valley of Luchon, 43 miles by road SE. of Bagnères de Bigorre, and 10 miles from the Spanish border. Its cold, tepid, and hot sulphurous waters (up to 130° F.) are recommended in rheumatism, cutaneous diseases, diseases of the respiratory organs, and have made Luchon a fashionable summer resort. There is also a winter season, Superbagnères (6000 feet high), on the plateau above Luchon, being a centre for winter sports. Pop. 4000.

Bagnes, the convict prisons of France. The name is from the Italian *bagno*, used originally of a bath in the Seraglio at Constantinople, and then apparently of a prison for slaves in it or adjoining it. The bagnes superseded in 1748 the old punishment of the Galleys (q.v.); but in 1852 they were themselves abolished, the imperial government substituting for them deportation to Guiana. The latest existing bagnes were those at Toulon, Brest, and Rochefort.

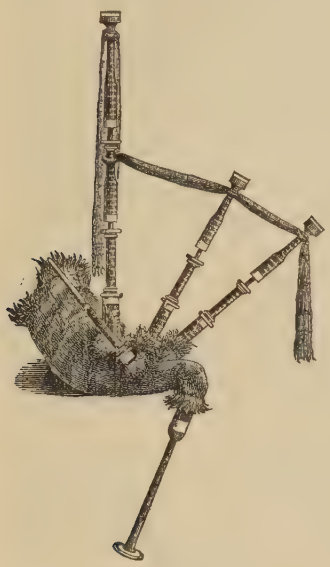
Bagni di Lucca, a bathing-place of Italy, 17 miles N. of Lucca; pop. 12,000. It is situated in the fine valley of the river Lima, a branch of the Serchio, and has hot springs of various temperature from 96° to 136° F.

Bagno a Ripoli, an Italian village, 5 miles distant from Florence, containing baths, around which wealthy Florentines have built palaces and villas. It is now really a suburb of Florence.

Bagno in Romagna, an Italian bathing-place, 35 miles E. by N. of Florence, on the right bank of the Savio, not far from its source. It has hot springs of temperature 108°–110° F., in which Natron (q.v.) is present.

Bagpipe, a wind-instrument, whose fixed characteristic has always been two or more reed-pipes attached to and sounded by a wind-chest or bag; which bag has in turn been supplied either by the lungs of the performer or a bellows. Some such instrument seems to have been generally known, at least throughout Europe and Asia, from a very early period. It was known to the Hittites (q.v.), Hebrews, Greeks, and Romans, and appears on their sculptures and coins. Nero is said by Suetonius to have been a performer upon it. An ancient terra-cotta, excavated at Tarsus in Asia Minor, by W. Burckhardt Barker, and supposed to date from about 200 B.C., represents a wind-chest with vertical rows of reed-pipes firmly fixed to the body of a performer. Sir William Ouseley met with it in Persia, where it is called 'reed-bag.' It is known in China and in some parts of India, and still continues in use in many countries of Europe, including Italy, France, and Britain. In the 15th and 16th centuries it was common in Germany and England; carvings occur of it in churches at Boston, Great Yarmouth, and Hull; as also at Melrose. It is mentioned by Chaucer and Spenser, and by Shakespeare. Fuller in his *Worthies* describes the Lincolnshire bagpipe, and it

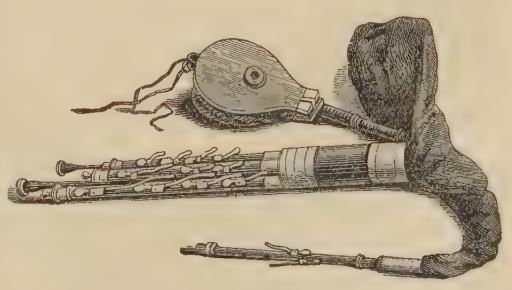
was played at Manton in that county not long before 1850. Geoffrey of Monmouth describes the bagpipe as a Welsh—not Irish or Scottish—instrument (see Leyden's essay in Murray's edition of *The Complaynt of Scotland*, 1872). The earliest Scottish bagpipe is probably one bearing the date 1409. Except that it wants the large drone, introduced early in the 18th century, it is similar to the Highland bagpipe of the present day.



Highland Bagpipe.

There is an entry in the Exchequer Rolls in 1362 of 40s. 'paid to the king's pipers,' which may indicate the use of the bagpipe at that date, and it is certainly mentioned in the old poem of *Peblis to the Play*. James VI., on a Sunday of 1581, returned from church at Dalkeith with two pipers playing before him; and the bagpipe has been employed in the services of the Catholic Church—e.g. at Edinburgh in 1536. It is supposed to have first been used in war by the Highlanders at the beginning of the 15th century, superseding the war-song of the bards. It has left its traces very distinctly in music, many popular national airs of different countries being evidently founded upon its drone bass and imperfect scale; while imitations of its effect are to be found in the works of many of the great modern composers. The Scottish Highland bagpipe is the only form of the instrument which is keeping its ground in Britain. It consists of an air-tight leathern bag, inflated by the breath of the player through a valved tube; and from this bag the air proceeds, through three wooden pipes containing reeds of fixed tone called *drones*, which furnish a continuous bass, and another reeded pipe of conical bore with holes in it, which produces the melody, and is termed the *chanter* (see fig.). The drones have reeds somewhat like those of the organ, the two smaller producing a note in unison with the lowest A of the chanter, the larger one A an octave lower. The chanter has a double reed like that of the oboe or bassoon, and has seven holes in front for the fingers, and one behind for the thumb of the left hand. The compass is only nine notes, from G in the treble clef to A above it; these, however, do not form a diatonic scale, not being all accurately tuned to each other; the general effect of the music approximates to the key of A, but with the sevenths flat. This imperfection of scale, together with its somewhat harsh tone, is the cause of its unpleasant effect upon the accurately sensitive ears of those accustomed to music in the natural diatonic scale; but from the same cause results its semi-barbarous, exciting stimulus upon the Highlander in the battlefield. In playing, the drones are thrown over the left shoulder, the bag tucked under the left arm, the blowpipe taken in the lips, and the chanter held with the fingers. In the Highlands, the 'skirl' of the bagpipe is equally esteemed in the 'lament' or at the merrymaking. The piper usually walks up and down while playing. The very abundant music for the instrument comprehends reels, strathspeys, marches, and pibrochs, a special peculiarity being the use of frequent and sometimes largely extended groups of ornamental passing notes, termed *warblers*. First-rate pipers have been known to introduce warblers of eleven notes between the last up beat, and the first down beat of a bar. Warblers of seven notes are common, and five usual, but their effect can only be understood from hearing the performance of a really good piper. That many of the older airs are written in the so-called pentatonic scale, omitting the fourth and seventh, is probably to be accounted for by the already-mentioned fact that several of the intervals on the instrument are not in perfect tune, and would naturally be avoided. Until recently bagpipe music was taught and even written in a notation of its own; but there are now several large collections of the music printed in ordinary notation. In music printed for the Highland pipes, no signatures are required, its nine notes being invariable. Each burgh in Scotland had formerly one or more pipers, and they formed also a regular part of the retinue of the Highland chieftains, the office being in both instances frequently hereditary. The most famous performers were the MacCrimmons, who for several generations were hereditary pipers to the MacLeods of MacLeod, and the last of whom died in 1822. Next to them the MacArthurs, pipers to the MacDonalds of the Isles, were held in esteem. Among burgh pipers the family of Hasties were hereditary pipers of Jedburgh for upwards of 300 years; the last of them died at the beginning of the 19th century. The clan piper still takes a prominent part in Highland festivities, funerals, and other celebrations; and a piper forms one of the royal establishment at Balmoral. Pipers are attached to all the Highland regiments (see BAND), and bagpipe performances and contests form a feature at Highland gatherings. The Breton *biniou* and the Calabrian *zampogna* are smaller variants of the Highland bagpipe.

The Scottish burgh pipers, above alluded to, are supposed to have played on a variety of bagpipe called the Lowland pipe. It was smaller than the Highland pipe, and played with a bellows instead of by the mouth, otherwise, however, being exactly similar in principle; as was also the old form of the Northumbrian pipe. A newer form of the latter is still played. It is also a bellows instrument, and has several keys on the chanter, giving it a chromatic scale; only one hole is uncovered at a time, and the end of the chanter is closed.



Irish Bagpipe.

The (later) Irish bagpipe (the 'elbows pipe,' as distinguished from the old 'iron pipe' blown by the mouth) possesses a nearly full chromatic

scale with a compass from D below the stave to D above the stave. The drones, which are all fixed on one stock, also possess keys, which are played with the wrist of the right hand, giving an harmonious bass which is very effective in the hands of a good player. Some of the drones are of great length, winding as many as three times the length of the apparent tube. The general arrangement may be seen from the figure. The player is seated, with one side of the bellows tied firmly to his body, the other to his right arm; the bag under the left arm, the drones resting over his leg, and the end of the chanter resting on a pad of leather on the knee, on which it is 'tipped' for the purpose of articulating many of the notes. From the softness of the reeds used, the Irish pipe is a very sweet instrument, but its use is rapidly dying out. The *musette*, also blown from bellows was a popular instrument in France during the 17th and 18th centuries. The compass was extended by two chanters (*le grand* and *le petit chalumeau*), and there were four or five drones encased in a cylinder. The peasants of Auvergne still use a small bagpipe with bellows for dance music. See books by Manson (1901), Fraser (1907), and Malcolm (1927).

Bagrat'idæ, a royal dynasty (9th–11th century) of Armenia (q.v.) and Georgia (q.v.).

Bagration, PETER IVANOVICH, PRINCE, a distinguished Russian general, descended from the royal family of the Bagratidæ of Georgia and Armenia, was born in 1765. Entering the Russian service, he was trained under Suvórof and fought in 1792 and 1794 against the Poles; in 1799, in Italy and Switzerland; and distinguished himself in the Austro-Russian war of 1805 against the French, especially in November of that year, when, with only 6000 troops, he bravely stood for six hours against a force of 30,000 under Murat. Subsequently, he was engaged in the battles of Austerlitz, Eylau, and Friedland, and took a part in the Russian campaign against the Turks, especially in the siege of Silistria, 1809. In the campaign of 1812 he commanded the second Russian army of the west, and had the misfortune to fail in his attack on Davout near Mohilev; but succeeded in forming a junction with the main army at Smolensk. He was, however, mortally wounded in the battle of Borodino (q.v.), and died October 7, 1812.

Bagshot Sands, a series of strata overlying the London clay; the name being derived from Bagshot Heath, in Surrey and Berkshire. See EOCENE.

Bahâism. See BÂBÎ.

Baha'mas, or LUCAYOS (Span. *Los Cayos*), a chain of British West Indian islands, stretching about 600 miles north-westwards from near Hayti to within 72 miles of the east coast of Florida. From Florida they are separated by the channel through which flows the Gulf Stream (q.v.); and from Cuba, by the old Bahama Channel. The chain extends in N. lat. from 21° to 27° 34′, and in W. long. from 72° 40′ to 79° 5′; and it rests mainly on two shoals—the Great Bank to the south, and the Little Bank to the north. There are 20 larger islands, 653 islets or *cays*, and 2387 reefs. The chief members of the group, if reckoned from the NW., are: Grand Bahama, and Great Abaco, Eleuthera, Harbour Island, New Providence, Andros, Cat Island, Watling's Island, Exuma, Long Island, Crooked Island, Fortune Island (or Long Cay), Acklin, Mayaguana (or Mariguana), Inagua, Little Inagua. Caicos (q.v.) and Turks Islands, which geographically belong to the Bahamas, have since 1848 been politically annexed to Jamaica.

The area is 4400 sq. m. (counting unimportant islets, about 5400 sq. m.); and in 1921 the population was 53,031. Of these one-fourth are Europeans; the great majority are descendants of liberated slaves. Of coralline formation, the islands generally are of reef-like shape, long, narrow, and low, the highest hill not exceeding 400 feet. With very little appearance of soil, and lacking in running streams and fresh-water lakes, they derive considerable fertility from the tendency of the porous rock to retain moisture. New Providence, Andros, and Abaco have barren tracts and forests of dwarf firs; the most productive islands are Eleuthera, Exuma, Long Island, Cat Island, and Inagua. The most lucrative industry is sponge-fishing. During the 20th century thousands of acres have been planted with sisal-hemp, which is exported. Other industries are lumbering, stock-farming, and the cultivation of pine-apples, grape-fruit, tomatoes, oranges, lemons, Guinea corn, maize, cotton, tobacco, coconuts, olives, pimento, cinnamon. Turtles are caught; shells, pearls, and ambergris are obtained. Salt used to be exported. There are several sisal-factories, pine-apple canneries, and timber-mills. The temperature ranges from 51° to 113° F.; but the mild, equable winter climate is often prescribed for pulmonary complaints. The annual rainfall is from 40 to 50 inches, being heaviest from May to October. In 1866 (Oct. 1), 1883 (Sept. 8), 1899 (Aug.), and 1908 (Oct. 1) the Bahamas were visited by destructive cyclones.

The Bahamas were Columbus's earliest discovery (1492). But the precise spot of his first landing is still debated. Cat Island was once believed to be his Guanahani or San Salvador; but later investigators have transferred the honour to Watling's Island, among others. The Bahamas, depopulated, but not again colonised by the Spaniards, were occupied by the English in 1629—to whom, after various vicissitudes of fortune in the wars with Spain and France, they were ultimately secured by the peace of Versailles (1783). Nassau, in New Providence, is the seat of government and chief port. During the American civil war Nassau became the station for blockade-runners, and thence derived unexampled prosperity. The constitution consists of a governor, aided by an executive council of nine members, a legislative assembly of nine, and a representative assembly of twenty-nine. See Shattuck, *The Bahama Islands* (1905); Moseley, *Bahamas Handbook* (1927); Britton and Millspaugh, *Bahama Flora* (1920).

Bahar. See BEHAR.

Bahâ'ullah. See BÂBÎ.

Bahawalpur, on the south bank of the Indus, is capital of an Indian native state in political connection with the Punjab. Five miles off the Sutlej is crossed by the fine 'Empress Bridge' of the Indus Valley Railway. Bahawalpur has a circuit of four miles—part, however, of the enclosed space being occupied by groves of trees. Bahawalpur has manufactures of scarfs and turbans, silks, chintzes and other cottons; and the immediate neighbourhood is remarkably fertile in grain, sugar, indigo, tobacco, and butter. Population, 18,000.—The surface of the state is remarkably level; but only about one-sixth, skirting the Sutlej and Indus, is capable of cultivation. From 1866 till 1879 the state was under British management, during the Nawab's minority, and it prospered greatly, waste lands being cultivated, canals increased, the army organised, and the railway carried through a large section of the territory. The great majority of the inhabitants are Mohammedans. Area, 16,000 sq. m.; pop. 800,000.

Bahi'a, capital of the state of Bahia, next to Rio de Janeiro and São Paulo the largest city of Brazil, is built on a range of hills stretching along

the seashore. It is otherwise called São Salvador —the more usual term being taken from *Bahia de Todos os Santos*, or *Bay of all Saints*, on the east shore of which it is situated. The bay, one of the finest in America, is defended by forts, with the island of Itaparica sheltering the entrance. Bahia is built partly on the shore and partly on high ground; the lower town is dirty, with narrow paths. Street railways connect the city with its suburbs, and flights of steps and a hydraulic elevator join the upper and lower town. Bahia has university faculties, an exchange, arsenal, and many churches and public institutions; is the seat of an archbishop, who is primate of Brazil; and is the point of departure for a railway line to the interior. It is connected by submarine telegraph with Pernambuco, Pará, and Rio. The chief exports are cocoa, sugar, cotton, coffee, tobacco, rice, rum, dye-stuffs, fancy woods, coconuts, horns, hides, diamonds, and bullion; and it imports manufactured goods, provisions, flour, salt, iron, glass, and wines. Bahia is the oldest city in Brazil, and till 1763 was the capital of the colony. The Bay was discovered by Amerigo Vespucci in 1503, and the city was founded by the Portuguese in 1510. Bahia is an admirable port, not so unhealthy as it was. Pop. (1920) 283,422, whites, blacks, and mulattoes.—The *state* (204,000 sq. m.; pop. 3,334,000) has mineral deposits, in great measure lost for want of good roads; some districts produce diamonds. The Brazil wood found in its primeval forests equals that of Pernambuco; and it exports sugar, coffee, tobacco, cacao, rice, and hides. The interior contains lofty and dry sierras; the maritime districts are fertile, well watered, and thickly populated.

Bahía Blanca, a thriving port of Argentina, in the south of Buenos Aires province, on the Naposta River, 3 miles from its mouth in the bay of Bahía Blanca. It is composed of two towns, a few miles apart. The Puerto Militar, to the east, is a garden city, which combines the character of a fashionable watering-place with that of a great naval base. The civil port owes its rapid growth to the wheat export of the south of Buenos Aires province, and to the enterprise of railway companies, which have greatly enlarged and improved the harbour, and are encouraging the development of new wheat-lands by irrigation. Much wood is shipped too. Pop. 44,000.

Bahía Honda, a harbour on the north coast of Cuba, 60 miles WSW. of Havana, protected by a fort. It is leased to the United States as a coaling station. Copper and coal are worked in the neighbourhood, and the sulphur springs of Aguacate lie a short distance south.

Bahr, an Arabic word signifying a large body of water, is applied both to lakes and rivers.—Bahr-el-Abiad (the White River) and Bahr-el-Azrak (the Blue River) are the chief branches of the Nile (q.v.).—Bahr-el-Ghazal is the name of the upper branch of the Nile, constituted by the Bahr-el-Arab and many other tributaries, which flows sluggishly eastward to join the Bahr-el-Jebel and so form the Bahr-el-Abiad. The Bahr-el-Ghazal gives name to a province of Anglo-Egyptian Sudan, bravely held by Frank Lupton. Another Bahr-el-Ghazal, E. of Lake Chad, was thought an old outlet.—Bahr-el-Yemen is the Red Sea (q.v.), and Bahr-Lút (Sea of Lot) the Dead Sea (q.v.).

Bahr, Hermann, Austrian-German writer, was born on the 19th July 1863 at Linz. He studied at Vienna, Graz, Czernowitz, and Berlin universities, travelled in Europe and America, edited various periodicals in Berlin and Vienna, managed the Deutsches Theater in Berlin, and afterwards lived in Salzburg. Leader of 'young Germany' against naturalism, champion of symbolism and the 'modern,' he proved himself a versatile essayist and a singularly receptive critic of literature and art in *Zur Kritik der Moderne* (1890), *Die Überwindung des Naturalismus* (1891), and other books. Later, though he still wrote excellent criticism and fascinating *Tagebücher*, he became more famous as a dramatist and novelist. *Das Konzert* has been well described as 'the most genially malicious comedy of modern times.'

Bähr, Johann Christian Felix, classical scholar, was born at Darmstadt in 1798, and educated at Heidelberg gymnasium and university, of which last he became ordinary professor of Classical Philology in 1823. His chief work is his *Geschichte der römischen Litteratur* (1828; 4th ed. 1868–70), which is noted for its clearness and comprehensiveness. Three supplements deal with the Christian Poets and Historians of Rome (1836), the Christian-Roman Theology (1827), and the History of Roman Literature in the Carlovingian Period (1840). His edition of Herodotus (2d ed. 1855–61) is also noteworthy. He died 27th November 1872.

Bahraich, a town of Oudh, India, near the old bed of the Gogra, 70 miles NE. of Lucknow. It is an old town, with some local trade in piece goods and copper utensils. To the shrine of Masáúd, a warrior and Mussulman saint, there is a great concourse of pilgrims in May. Population, 27,000.

Bahrdt, Karl Friedrich (1741–92), a German theologian and freethinker, was born at Bischofswerda, in Saxony, and studied at Leipzig, where he became professor of Biblical Philology in 1766. Two years later he had to leave Leipzig for his immoral conduct. At Erfurt he was placed in the chair of Biblical Antiquities. Here he wrote two works whose heterodoxy involved him in controversies. In 1771 he was called to the chair of Theology at Giessen, and here also he preached with approbation for a few years, until he found it necessary to resign. Inhibited from teaching by the government, he betook himself to Halle in 1779, and there for ten years he kept a public-house. Two political pamphlets brought him a year's imprisonment at Magdeburg, and gave him leisure to write his memoirs (Berlin, 1790). See Life by Leyser (2d ed. 1870).

Bahrein Islands, a group of islands in the Persian Gulf, 20 miles off the El Hasa coast. The main island, Awal or Bahrein (area, 200 sq. m.) is 30 miles long and 10 broad. It is hilly in the centre, and little cultivated. Dates are grown. Manama (pop. 25,000), the capital, has a good harbour. The famous pearl-fisheries have been known since ancient times. The transit trade and smuggling are active. The islands are ruled by a sheik, and since 1867 have been under British protection. Pop. about 120,000 (mostly Arab Sunnites and Shîites).

Baiæ, a small town of antiquity, on the coast of Campania, 10 miles W. of Naples and opposite Puteoli, where the present castle of Baja stands. When the Roman empire was in its greatest splendour, the beauty of its situation, the fineness of the surrounding scenery, and the excellence of its mineral springs made Baiæ such a favourite resort of the Roman nobles that for want of space for their baths and villas they built out into the sea. Julius Cæsar, Piso, Pompey, Marius, Julia Mammæa, and others had country-houses at Baiæ. Horace preferred Baiæ to all other places in the world. The ruins, still standing on the desolate coast, or visible beneath the clear waters of the sea, are now the only evidence of the former magnificence of Baiæ. The ruins of three supposed temples, as well as the remains of a few *thermæ*, or warm

baths, still attract the attention of archæologists. The harbour, one of the largest belonging to the Romans, is now small and poor. The surrounding country is covered with the ruins of Roman villas, sepulchral monuments, and other buildings.

Bai'kal (in Turkish, *Bei-kul*—i.e. 'rich lake') is, after the Caspian Sea and the Sea of Aral, the largest lake of Asia, with an area of some 11,580 sq. m. It is a fresh-water lake, and is situated in the south of Siberia, in the Buriat-Mongol republic, in 51° 20′ to 55° 30′ N. lat., and 103° to 110° E. long., and somewhat resembles a sickle in shape. Its length is 370 miles, and its breadth 9½ to over 50 miles; height above the sea, about 1600 feet; mean depth, 850 feet, but in some places as much as 5400 feet, more than 3800 feet below sea-level. The volume of water is calculated accordingly to be more than double that of Lake Michigan, which has a very much larger area. Its waters are a deep blue, and remarkably clear. The Baikal Mountains, a spur of the Altaï, inclose the lake, which is fed by numerous streams, the chief of which are the Selenga and Bargusin. Its outlet is by the Lower Angara, a chief tributary of the Yenisei; but the river is inconsiderable in size compared with those which flow into the lake. It has several islands, the largest of which, Olkhon, has a length of 32 miles. There are numerous hot springs on its shores, and earthquakes are frequent. Formerly the lake seems to have been much more extensive; its level has fallen within modern times (see ASIA). In the southern part a subaqueous ridge divides Baikal into two basins. The lake has two commercial ports and a fleet of steamers. Till the completion of the Siberian railway round the south end (in 1904, during the war with Japan), trains were ferried across by special ferry-boats—in winter by help of ice-breakers, or even on the ice. Salmon and sturgeon are abundant, the former coming up the Yenisei from the Arctic Ocean, and large quantities of a fish resembling herring are also caught in it. It is one of the few lakes containing fresh-water seals, the capture of which employs most of the Russian settlers throughout the summer. A peculiar fish, called the golomynka (*Callionymus baicalensis*), which is almost one mass of fat, yielding admirable oil, was at one time found in immense numbers cast up on the beach after a storm, but it is now much scarcer. The surface of the lake is frozen from November to May, but the traffic is carried on over the ice. Besides the Russians in the town of Kultuk at the SW. end (with a harbour and lighthouse), the shores of Lake Baikal are also inhabited by tribes of the Buriats and Tunguses. See a study by Schokalsky and Schmidt (Bordeaux, 1907).

Baikie, WILLIAM BALFOUR, traveller, naturalist, and philologist, was born at Kirkwall, Orkney, 27th August 1825, and having studied medicine in Edinburgh, entered the royal navy as assistant-surgeon in 1848. He served in the Mediterranean, and from 1851 to 1854 acted as assistant-surgeon at Haslar Hospital. He was appointed surgeon and naturalist to the Niger expedition of 1854, and succeeding through the captain's death to the command of the *Pleiad*, in his first voyage he penetrated 250 miles higher than any previous traveller; but in his second expedition of 1857 the *Pleiad* was wrecked, and he was left by his fellow-explorers to continue his work alone. He founded a native settlement called Lukoja, at the junction of the Quorra and Benue, and within five years he had opened the navigation of the Niger, constructed roads, collected a native vocabulary, and translated parts of the Bible and Prayer-book into Haussa. He died while on leave of absence at Sierra Leone, 12th December 1864. He published *List of Books and Manuscripts relating to Orkney* (Zetland, 1847); along with R. Heddle, *Historia Naturalis Orcadensis: Zoology* (Part I. 1848); and *Observations on the Haussa and Fulfulde Languages* (1861).

Bail, as generally understood, means the security given that a person charged with a crime or offence shall appear for trial, he obtaining liberation from prison in the meantime. The laws of England and Scotland differ on this subject. In England the committing magistrate may in all cases, except treason, admit to bail. At common law, he, in cases of misdemeanour, was bound to release the accused on bail; but recent legislation, rendering the costs of prosecution chargeable on the county, has conferred on the magistrate a wide discretionary power in the matter of bail. In cases of treason the King's Bench Division may admit to bail. The magistrate must judge of the sufficiency of the person tendered as bail, and must fix at his discretion the amount of bail to be paid if the accused fails to appear. If the accused seek to leave the country, the bail may have him apprehended. In Scotland, the law was that in capital cases (i.e. according to the old law of punishment—serious theft being capital) the magistrate was not entitled to accept bail, but that in all other cases the accused had a right to bail, which by a statute of 1799 was fixed at certain amounts for the various classes of society; £300 for a burgess or householder, and £60 for an inferior person. This arrangement was, however, found to work badly, and by the Bail Act of 1888 the law was altered so that all crimes and offences except murder and treason became bailable; the fixing of the amount was given to the magistrate granting bail, an appeal to the High Court being allowed both to the applicant and to the public prosecutor. The application for bail must be disposed of within twenty-four hours, failing which the accused must be forthwith liberated. The right of the High Court and of the Lord Advocate to admit to bail was not affected by the act. When an accused person fails to appear, sentence of outlawry is pronounced, and the bail-bonds are forfeited. In civil procedure in England, bail is used also as the technical name of securities given for the release of an arrested ship, or the loosing of a foreign attachment, and in some other cases.

In the United States, the practice with regard to bail is very much the same as in England both in civil and criminal cases. Bail is admitted upon all arrests in criminal cases when this offence is not punishable with death; in cases of treason against the government it may be admitted in the discretion of the court. When the punishment is death, bail can be taken only by the supreme or circuit court, or by a judge of the district court of the United States. The bail on commercial contracts is not discharged by death; bail for appearance in court is discharged in that event. The enforcement of recognisance is generally similar to that under the common law. See CRIMINAL LAW.

Bailén, or BAYLEN, a town of Andalusia, Spain, 22 miles N. of Jaén. It has manufactures of glass, bricks, tiles, &c. Pop. 9000. Here the Spaniards won their first and only victory over the French, 19th July 1808, when about 18,000 French soldiers laid down their arms.

Bailey, NATHAN or NATHANIEL, an early English lexicographer, whose work appeared in 1721 under the title, *An Universal Etymological English Dictionary*, to which a supplementary volume was added in 1727. In 1802 it had reached its thirtieth edition. An interleaved copy was the foundation of Johnson's more famous work. Lord Chatham is said to have read it through twice, and it

was one of the sources from which Chatterton drew his Old English words. In 1730 appeared the *Dictionarium Britannicum*, by several hands, under the supervision of Bailey. This busy author wrote several other books, now of but slight importance. Of his life very little is known, save that he was a 'Seventh-day Baptist' and kept a boarding-school at Stepney, where he died, June 27, 1742. The English Dialect Society reprinted, in 1883, the 18th-century dialect words preserved in Bailey's Dictionary.

Bailey, PHILIP JAMES, poet, was born at Nottingham, 22d April 1816, and after studying at Glasgow University, was called to the English bar in 1840, but never practised. *Festus*, the poem by which he is best known, was published in 1839, and reached an 11th (Jubilee) edition in 1889, having in the course of these various editions received a large amount of new matter. It attracted considerable notice in England, and in America was hailed with a perfect tornado of applause. Before the enthusiasm had cooled, its author was in certain quarters mentioned in the same breath with Shakespeare, Milton, and Goethe. And by so great a poet as Rossetti it was, says his brother, under date 1843 'enormously relished, read again and yet again.' At least one modern critic ranks him with Browning and Tennyson, and thinks that 'for sheer sublimity he surpasses both.' In 1850 appeared *The Angel World*, afterwards incorporated—not to its advantage—with *Festus*. Later works were *The Mystic*, *The Age*, and *The Universal Hymn* (1867), and of these also passages were put into *Festus*. He lived long in retirement, but was made LL.D. of Glasgow in 1901; and he died 6th September 1902.

Bailey, SAMUEL (1791–1870), born in Sheffield, became a banker there, wrote books, stood—twice and unsuccessfully—for parliament as a philosophical radical, and left £80,000 as a bequest to the city. In his first work, *Essays on the Formation and Publication of Opinions* (1821), he ably defended the proposition that a man's opinions are independent of his will. His *Essays on the Pursuit of Truth and on the Progress of Knowledge* (1829) are only less valuable. His many controversial books on questions of political economy are already almost forgotten, though these, as well as his pamphlets and treatises on political representation, primogeniture, and the like, are characterised alike by terse exposition and vigorous style. Not less interesting but of less value, because to some extent the fruit of insufficient knowledge, are his *Review of Berkeley's Theory of Vision* (1842), *Theory of Reasoning* (1851), and *Letters on the Philosophy of the Human Mind* (1855–63). The third series of the last contains an able defence of utilitarianism, in which the author avows himself a thorough determinist. His conjectural emendations of the text of Shakespeare, published 1862–66, are of little value.

Bailey (probably derived from the middle Lat. *ballium*, frequently confused with *baillie*; 'the jurisdiction of a *bailie* or *bailiff*'), the whole space inclosed within the external walls of a castle, with the exception of that covered by the keep. This space was variously disposed of, and, of course, differed greatly in extent. Sometimes it consisted of several courts, which were divided from each other by embattled walls, so as to form a series of fortifications. When these courts were two in number, they were known as the outer and inner bailey. The entrance to the bailey was generally by a drawbridge over the ditch, and through a strong machicolated and embattled gate. It was often of great extent, containing the barracks for the soldiers, lodgings for workmen and artificers, magazines, wells, chapels, and sometimes even a monastery. The word has survived in some proper names, as the *Old Bailey*, the seat of the Central Criminal Court in London, so called from the ancient *bailey* or *ballium* of the city wall between Ludgate and Newgate, within which it was situated. A new 'Old Bailey' was opened in 1907. 'Old Bailey style' refers to the licence of vituperation assumed to characterise its proceedings. In Durham the *bailey* is now a street, with the old name retained, while the name survives also in Colchester and York. The term is sometimes applied to the outer wall or first line of defence, as well as generally to any of the circuits of walls which surrounded the keep.

Bailie, a Scottish term, with several legal applications. It popularly signifies a magistrate of a municipal corporation in Scotland, vested, *ex officio*, with judicial and administrative authority within the city or burgh. The election of magistrates—the Provost (q.v.) and bailies—in the burghs of Scotland is regulated by the Town Councils Act, 1900. Under that statute the magistrates are elected by the town council from among their own number. Each bailie holds office from the date of his election to the date at which he falls in ordinary course to retire as a councillor. A woman may now be provost or bailie. In royal burghs, the office of bailie is in some respects analogous to that of alderman in England. The election of magistrates in burghs of barony and regality is now regulated by the Town Councils Act, 1900, but the number of magistrates and councillors remains the same as under the former law, unless and until it has been altered in terms of the act. There is a bailie for the Sanctuary or Abbey of Holyrood, appointed by the Duke of Hamilton as hereditary keeper, and having jurisdiction within the precincts (see SANCTUARY). The word Bailie was also formerly a term in the practice of Scots conveyancing, and signified an officer who represented the superior at the ceremony of giving *seisin* or sasine; but by the changes and simplifications effected by legislation, the office of bailie in this sense has been abolished.

Bailiff (Scots *bailie*, Fr. *bailli*, Ital. *balio*; all from late Lat. *bajulivus*, an adj. from *bajulus*, 'a carrier,' then 'a manager'), an officer with public authority in a certain district. In England it was applied formerly to the king's officers generally, and it is still the formal title of the chief-magistrate of certain towns, as the 'Bailiff of Dover Castle.' The name *bajulos* was given at the Greek imperial court in Constantinople to the chief tutor of the imperial children, afterwards to the Venetian superintendent of the foreign merchants there, and in the form *Balio* to the Venetian ambassadors themselves. The title *Ballivus* was introduced by the Knights of St John into the south and west of Europe, as the eight members of their chapter were called *Ballivi conventuales*. In England the name was introduced after the conquest, and applied loosely to several officials; thus the sheriff was spoken of as the 'king's bailiff,' his shrievalty as his 'bailiwick.' Later, the word became applied to elective functionaries, but gradually to definite offices, as the presiding magistrate of a town—the English reeve, but unlike that officer, nominated by the over-lord instead of the citizens—as the bailiff of Beverley, by the Archbishop of York. By the end of the 13th century, the mayor had supplanted the bailiff almost everywhere.

BAILIFF, in English law, is a legal officer, and may be described as the keeper, protector, or superintendent of some duty or charge legally imposed on him. As officers of the law, bailiffs put in force

arresting process, and they perform other duties within the county or bailiwick required of them by the sheriff, who is their immediate official superior. In this sense bailiffs are either *bailiffs of hundreds* or *bound bailiffs*. The duty of the former is to collect fines, summon juries, attend the judges and justices at the assizes and quarter-sessions, and execute writs and processes in the several hundreds. *Bound* bailiffs, again, are officers usually joined by the sheriffs with the bailiffs of hundreds, and employed on account of their adroitness and dexterity. They are called bound bailiffs because, the sheriff being civilly responsible for their official misdemeanours, they are annually bound in an obligation, with sureties, for the due execution of their office. There are also *special bailiffs*, who are officers appointed by the sheriff on the application of the party suing out the process to be executed; and whenever a party thus chooses his own officers, he is considered to discharge the sheriff from all responsibility for what is done by him. There is, besides, another exceptional class of bailiffs, called bailiffs of *liberties*, honours, manors, and other lordships and franchises, whose appointments, duties, and responsibilities are regulated by the 7 Vict. chap. 19. The *high bailiff* of a county court is a permanent officer under whose directions the process of the court is executed by sub-bailiffs. The office of high bailiff is usually combined with that of the registrar.

The sheriff himself is the 'king's bailiff,' and, as such, it is his business to preserve the rights of the crown within his bailiwick. He must seize to the sovereign's use all lands devolved to the crown by attainder or escheat; must levy all fines and forfeitures; and must seize and keep all waifs, wrecks, estrays, and the like, unless they be granted to some subject.

In the United States, the term bailiff is seldom used except sometimes to designate a sheriff's deputy or constable, or a party liable to account to another for the rents and profits of real estate; as in some cases a tenant in common who receives more than his share. The duties of a bailiff are performed in America by a deputy-sheriff, constable, or tipstaff, who are officers acting under the orders of the sheriff or magistrate, or under the immediate supervision of the court.

Bailiwick legally means the county or district within which the sheriff, as bailiff of the king, may exercise jurisdiction. It is often applied by English writers to foreign towns or districts under a *vogt* or *bailli*.

Bailleul, a town in the French department of Nord, 19 miles NW. of Lille, with various manufactures, and a brisk trade in corn and cheese. It was wrecked in the Great War. The Baliol family hence derived its name. Pop. 13,000.

Baillie, Lady Grizel, born in 1665, was the daughter of the Scottish patriot, Sir Patrick Hume (q.v.), afterwards first Earl of Marchmont, and in 1684 supplied him with food during his concealment in the vault beneath Polwarth church. She shared her parents' exile at Utrecht (1686–88), and in 1692 married the son of Baillie of Jerviswood. He died in 1738, and she on 6th December 1746. She is remembered by her songs, the best of which is 'And werena my heart light I wad die.' See her *Household Book* (Sc. Hist. Soc. 1912), and the Memoirs (1822) by her daughter, Lady Murray.

Baillie, Joanna, poetess, was born in Bothwell manse, in Lanarkshire, 11th September 1762. Her father, a Presbyterian minister, in 1776 became professor of Divinity in Glasgow; her mother was the sister of William and John Hunter. She received a superior education, and soon began to manifest those talents which subsequently excited the admiration of the public. Her career was a singularly happy one, but devoid of all striking incident. In 1784 she went to reside in London, where her brother, Matthew Baillie, had established himself as a physician. In 1806 she and her sister took a house for themselves at Hampstead, and here she remained till her death, which occurred on the 23d of February 1851, when she had attained the venerable age of 88. Agnes, her sister, survived till 1861, being then a hundred years old. No authoress ever enjoyed a larger share than Joanna Baillie of the esteem and affection of her literary contemporaries. All vied in showing her a courteous respect, and even America sent its votaries to her little shrine at Hampstead. Her greatest achievement is undoubtedly the nine *Plays on the Passions* (1798–1836), which, though erroneous in conception, are full of noble and impressive poetry, and often characterised by intense dramatic power. The principle upon which Miss Baillie proceeded in the construction of these plays, was, like Marlowe and George Meredith, to take a single passion as the subject of a work, and to exhibit its influence on an individual supposed to be actuated by nothing else. In spite of this method of treatment, there are scenes, in her tragedies especially, where the interest of the reader is intensely excited by the great art shown in the minute delineation of a particular passion, and where he is forced to forget the artificial theory of the author. The most popular as well as the most powerful of her works is the tragedy of *De Monfort*. It was brought out at Drury Lane in 1800, Kemble and Mrs Siddons taking the leading parts. Her *Family Legend*, produced at Edinburgh under Scott's auspices in 1810, was a great success. Many of Miss Baillie's minor pieces are marked by a sprightly grace of versification, and a playful serenity of spirit, which pleasantly remind one of her personal character. She was under middle size, but not diminutive; her form was slender, and her countenance showed talent, worth, and decision. See Lady Richmond Ritchie's *Book of Sibyls* (1883), and Margaret Carhart, *Life and Work of Joanna Baillie* (1923).

Baillie, Matthew, anatomist, brother of the above, was born in Shotts manse in 1761. His mother was a sister of the two celebrated anatomists, William and John Hunter; and Matthew, after seven years at Glasgow and Oxford (1773–80), studied anatomy under his uncle William, with such success, that in 1783 he was found qualified to succeed to his practice and lectureship. Working often sixteen hours a day, he made a very large income—one year, £10,000—so that he purchased the estate of Duntisborne in Gloucestershire, and at his death there, on 23d September 1823, left a fortune besides of £80,000. His works, with a Life by Wardrop, appeared in 2 vols. in 1825. The most important is on *Morbid Anatomy*, published in 1795.

Baillie, Robert, Presbyterian divine, was born at Glasgow in 1599, and educated at the university of that city. In 1622 he received episcopal ordination, and was shortly after presented to the parish church of Kilwinning. In 1637 he refused to preach in favour of Laud's service-book; and in 1638 he sat in that famous General Assembly which met in Glasgow to protest against the thrusting of Episcopacy on an unwilling people, but conducted himself with greater prudence and temperance than was quite agreeable to his excited brethren. However, he soon threw himself eagerly into the national cause, and served as a chaplain in the Covenanting army at Duns Law (1639). In 1640 he was selected by the Scottish leaders to go to London, with other commissioners, and draw up charges against Archbishop Laud. On his return to Scotland in 1642,

he was appointed joint-professor of Divinity at Glasgow, along with Mr David Dickson. In 1643 he was again sent to London as a delegate to the Westminster Assembly of Divines, where he conducted himself in an unobtrusive manner, but cordially concurred in the doctrines which were drawn up. It is curious to notice that, though he had himself experienced the injustice of intolerance, he yet, like almost every other theologian of his age, vehemently discarded the principle of toleration, and asserted the divine right of Presbytery with no less emphasis than Laud did that of Episcopacy. In 1649 he was chosen by the church to proceed to Holland, and to invite Charles II. to accept the Covenant and crown of Scotland. He performed his mission skilfully; and, after the Restoration, through Lauderdale's influence, he was made Principal of Glasgow University. He died July 1662. His pamphlets and larger works, fourteen in number, are well-nigh forgotten; but his *Letters and Journals*, edited by David Laing for the Bannatyne Club (3 vols. 1841-42), are a valuable contribution to our knowledge of the times.

Baillie, Robert, of Jerviswood, the 'Scottish Sidney,' was a native of Lanarkshire, who first came into notice in 1676 through his rescue of a brother-in-law, the Rev. Mr Kirkton, from the clutches of Archbishop Sharp's principal informer. For this he was fined 6000 merks (£318), and, refusing to pay, was sent to prison; but so strong was the indignation of the Scottish gentry, that he was released at the end of four months, on payment of half the fine. In 1683 he took a prominent part in a scheme of emigration to South Carolina, as he saw no other refuge from the degrading tyranny of the government. About the same time, however, he entered into correspondence with the heads of Monmouth's supporters in London, Russell and Sidney, and subsequently repaired there to concert measures for securing adequate reforms. On the discovery of the Ryehouse Plot, he was arrested and sent down to Scotland. Accused of conspiring against the king's life, and of hostility to monarchical government, he was tried at Edinburgh, and condemned to death upon evidence at once insignificant and illegal. His bearing, both on his trial and during his imprisonment, was such that his cousin, Bishop Burnet, declared 'it looked like a reviving of the spirit of the noblest of the old Greeks or Romans, or rather of the primitive Christians and martyrs.' The barbarous sentence for high treason was carried into execution on the very day that it was passed, 24th December 1684.

Bailly, Jean Sylvain, a famous French astronomer, President of the National Assembly of 1789, and Mayor of Paris, was born in that city, September 15, 1736. From art he turned aside to literature, but was fortunately induced by Lacaille to study astronomy, which proved to be the true sphere of his genius. He was early admitted to the Académie des Sciences, and he justified his honours by a succession of learned and elegantly written treatises on astronomical subjects, which culminated with his great *Histoire de l'Astronomie* (5 vols. 1775–87). Elected to the Académie Française (1784), and next year to the Académie des Inscriptions, he was thus a member of the three academies at once, an honour that had fallen to no one before him save Fontenelle. The revolution interrupted his peaceful studies. Elected President of the National Assembly, June 17, 1789, and Mayor of Paris on the 15th of July, he conducted himself in these capacities with great integrity and purity of purpose; but at last lost his popularity by allowing the National Guard to fire on the masses who were assembled in the Champ de Mars, on the 17th of July 1791, to demand the dethronement of the king. He now threw up his mayoralty, withdrew altogether from public affairs, and went to live first at Nantes, and afterwards with his friend Laplace at Melun. Here he was seized by the Jacobin soldiery, and brought to Paris, where he was accused of being a royalist conspirator, condemned and executed with the usual Jacobin preliminary of savage insult, November 11, 1793. From his papers were published his *Essai sur l'Origine des Fables et des Religions Anciennes* (2 vols. 1799), and his *Mémoires d'un Témoin de la Révolution* (3 vols. 1804). See Nourrisson, *Trois Révolutionnaires: Turgot, Necker, Bailly* (1885).

Bailment, in English law, means the delivery of goods in trust for some special purpose, on a contract, express or implied, to conform to the purpose of the trust. Deposits, pledges, or pawns, contracts for hiring goods, and gratuitous loans, are all varieties of bailment. In the United States the same definition applies. Practically, bailments are of three kinds: (1) for the benefit of the bailor or his representative; (2) for the benefit of the bailee or his representative; (3) for the benefit of both parties. In the first case, as when a person receives the goods of another to keep without recompense, he is responsible only for gross neglect; in the second, he is responsible for the slightest neglect; in the third case, the bailee is bound only to ordinary care and diligence. Bailees, such as warehousemen, innkeepers, and common carriers, have a lien on the property bailed for their charges.

Baily, Edward Hodges, sculptor, was born at Bristol, 10th March 1788. Two Homeric studies which he had executed were praised by Flaxman; and in 1807 he went to London, saw Flaxman, and entered his studio. He won several medals; but his 'Eve at the Fountain' (1818) first established his reputation. George IV. employed him, along with other artists, to execute the sculpture in front of Buckingham Palace, the figures on the Marble Arch, and the 'Triumph of Britannia.' Besides these, Baily executed a great number of busts and statues—Wellington, Byron, Telford, Earl Grey, and Sir Astley Cooper. The statue of Nelson, in Trafalgar Square, is likewise his, as also those of Charles James Fox and Lord Mansfield in St Stephen's Hall, Westminster. His 'Eve listening to the Voice,' 'Sleeping Nymph,' 'Girl preparing for the Bath,' and 'The Graces Seated,' are among his finest efforts. He died 22d May 1867.

Baily, Francis, astronomer, was born at Newbury, Berks, 28th April 1774. An apprenticeship in a London mercantile house was followed by a few years of roving, but at the age of 25 he settled down as a stockbroker in London. In financial business he showed great capacity, and he gradually acquired a large fortune. Meantime he published a series of excellent books on questions involved in banking and assurance. At 51 he retired from business to devote himself entirely to astronomy. Scientific honours were soon showered upon him both from home and abroad. Among the chief of the services rendered to his chosen subject through his unwearying industry, were his share in the foundation of the Astronomical Society, and in the improvement of the *Nautical Almanac*, his laborious repetition of Cavendish's experiment to measure the density of the earth (see Earth), and the production of the Astronomical Society's Star-catalogue. The latter, says his biographer, Sir J. Herschel, 'put the astronomical world in possession of a power which may be said, without exaggeration, to have changed the face of sidereal astronomy. Baily's writings, ninety-one in number, included a Life of Flamsteed (1835), but

mostly appeared in the Astronomical Society's *Memoirs*. He died in London, 30th August 1844.

Baily's Beads, the name given to a phenomenon in connection with eclipses of the sun, first fully described by Francis Baily. Just before the beginning and after the end of the obscuration by the moon of the sun's disc, the thin crescent-shaped unobscured portion of the sun seems usually to become suddenly discontinuous, and looks like a belt of bright points, varying in size and separated by dark spaces. The resulting appearance has been compared to a string of beads. The phenomenon is an effect of irradiation and the inequalities of the moon's edge. To irradiation it is also due that, by defect of the retina of the eye, bright objects seem on a dark ground seem larger than they really are.

Bain, ALEXANDER (1818–1903), writer on mental philosophy, was born at Aberdeen. Educated at the university of his native city, he lectured there as deputy-professor for a few years, afterwards taught Natural Philosophy at the Andersonian University, Glasgow, filled the office of assistant-secretary to the Metropolitan Sanitary Committee and the Board of Health, examined in mental philosophy for the university of London and the Indian Civil Service, and was appointed in 1860 to the chair of Logic in Aberdeen. He resigned in 1881, and the same year was elected Rector of his university. In 1859 he was made LL.D. by the Edinburgh University. Bain's chief works are *The Senses and the Intellect* (1855), and *The Emotions and the Will* (1859), completing a systematic exposition of the phenomena of the human mind. Other books are *Mental and Moral Science, a Compendium of Psychology and Ethics* (1868); *Logic, Deductive and Inductive* (1870); *The Relation of Mind and Body* (1873); *Education as a Science* (1879). He wrote also a biography of James Mill (1881), as well as a criticism of John Stuart Mill (1882), besides several handbooks of English grammar; he assisted in editing Grote's *Aristotle*, and edited Grote's *Minor Works*. In philosophy, Bain was a conspicuous representative of the empirical or experimental school, in opposition to the *a priori*, or transcendental. His psychology is based on physiology, after the manner of Hartley's; but instead of considering the human organism as capable only of receiving impressions and of acting in response thereto, he finds in it a power of originating active impulses (Spontaneity), and thus obviates many of the defects alleged by *a priori* philosophers to inhere in the system of sensationalism, as hitherto exhibited. His two chief works were pronounced by J. S. Mill to be the most careful, the most complete, and the most genuinely analytical exposition of the human mind which *a posteriori* psychology had produced. See ASSOCIATION OF IDEAS, and his *Autobiography* (1904).

Baini, GIUSEPPE, musician, was born at Rome in 1775, and was director of the pope's choir from 1814 till his death in 1844. The severe gravity and profound science of his compositions contrasted strongly with the careless style and shallow dilettanteism of most of his compeers; but less by his compositions than by his historical researches did Baini secure for himself a prominent place in musical literature. His principal work is his Life of Palestrina (1828).

Bairaktar (more correctly, Bairak-dar), signifying 'standard-bearer,' is the title of the energetic Grand-vizier Mustapha. Born in 1755, of poor parents, he entered the military service at an early age, and soon distinguished himself by his valour. When he was pasha of Rustchuk in 1806, he fought with some success against the Russians, and after the revolt of the janissaries in 1807, by which Selim III. (see TURKEY) was deposed in favour of Mustapha IV., Bairaktar marched his troops to Constantinople, where they found the dead body of Selim lying in the first court of the seraglio. Bairaktar executed all those who had had any share in the murder, deposed Mustapha IV., and proclaimed the brother of this prince, Mahmoud II., sultan on the 28th July 1808. Bairaktar was now appointed grand-vizier, and endeavoured to carry out Selim's reforms, and to strengthen the regular army. His chief object was the annihilation of the janissaries; but, favoured by the fanatical people, these prætorians rebelled, and, with the support of the fleet, attacked the seraglio on the 15th November 1808, and demanded the restoration of Mustapha IV. Bairaktar defended himself bravely; but when he saw that the flames threatened to destroy the palace, and that he was in danger of falling alive into his enemies' hands, he strangled Mustapha, threw his head to the besiegers, and then blew himself up.

Bairam, the Persian and Turkish name for a Mohammedan festival somewhat analogous to Easter. It commences immediately after the fast of Ramadan, or Ramazan, which corresponds in its abstinence to Lent. Being one of the two great feasts of the Moslems, it is looked forward to with great interest, the zest being enhanced by the previous abstinence. Properly, it should terminate in one day, but the festivities are generally protracted over three days. Seventy days after, the Moslems celebrate the second Bairam ('the festival of the sacrifices'), instituted in commemoration of the offering up of Isaac by Abraham, on which all the faithful of Islam must sacrifice victims. The second Bairam usually lasts four days. The Mohammedan year being the lunar one of 354 or 355 days, in about thirty-three years the festivals run through all the seasons. In 1887 the first Bairam fell on the 23d June, in 1919 on the 30th, in 1920 the 18th.

Baird, SIR DAVID (1757–1829), born at Newbyth, East Lothian, entered the army in 1772, and in 1779 sailed to India as captain in a Highland regiment. He was soon in the midst of a sanguinary war. In July 1780, Hyder Ali burst into the Carnatic at the head of 100,000 men, disciplined and commanded by French officers. A portion of the English army fell into an ambuscade and was cut to pieces. Among the few who remained alive to be taken prisoners was Baird. He was thrown into a dungeon at Seringapatam, where he endured a captivity of nearly four years. In March 1784 he was released, and after a two years' visit to England (1789–91), he took part in several important sieges, attacks, and skirmishes; till in 1799, now a major-general, he memorably signalised himself at the victorious assault of Seringapatam. He led the storming-party, Colonel Wellesley (afterwards Duke of Wellington) commanding the reserve. Baird indignantly complained when Wellesley received the appointment of governor of Seringapatam, which he felt was due to his own services. He commanded an expedition sent to Egypt in 1801 for the expulsion of the French. On his return to India in 1802, he found that the star of Wellesley was in the ascendant; and Baird applied for leave of absence. He was received at court with great distinction, knighted in June 1804, and made a K.C.B. in the following August. In 1805–6 he commanded the expedition which finally wrested from Holland the Cape of Good Hope. In 1807 he commanded a division at the siege of Copenhagen; and in 1808 was sent to Spain with an army of 10,000 men, to assist Sir John Moore. He distinguished himself in the battle of Coruña, 16th January 1809, when his left arm was shattered by grape-shot, and

had to be amputated. On the death of Moore, he succeeded to the command. On this occasion he received, for the fourth time in his life, the thanks of parliament, and was created a baronet. He retired from active service in 1810, and in 1820 was made commander of the forces in Ireland. He died at Crieff. See Lives by Theodore Hook (1832) and W. H. Wilkin (1913).

Baird, JAMES, ironmaster, was born at Kirkwood, Lanarkshire, 5th December 1802. The fourth son of Alexander Baird, a coal-master, he was educated at Old Monkland, and was for a short time at Glasgow University. In 1826 he was associated with his father and two brothers, William and Alexander, in the leasing of coal-fields at Gartsherrie and elsewhere. Blast-furnaces were added in 1830, and James Baird assumed the active management. Between 1842 and 1864 the blast-furnaces at Gartsherrie, Eglinton, Muirkirk, and elsewhere increased from sixteen to between forty and fifty, capable of turning out 300,000 tons of iron annually, and employing 10,000 men and boys. As the firm increased in wealth, estates to the value of £2,000,000 were acquired by the brothers. James Baird represented the Falkirk burghs in 1851–52 and in 1852–57. In later years he built and endowed various schools, founded the 'Baird Lectures' for the defence of orthodox theology in Scotland in 1871, and in 1873 gifted to the Church of Scotland a sum of £500,000, 'to assist in providing the means of meeting, or at least as far as possible promoting the mitigation of, spiritual destitution among the people of Scotland.' He died at his seat of Cambusdoon, near Ayr, 20th June 1876. He was twice married, but left no family. His property was valued at £3,000,000. See Baird's *Bairds of Auchmedden* (1870).

Baird, SPENCER FULLERTON, LL.D., an American naturalist, was born at Reading, Pennsylvania, 23d February 1823. He was educated at Dickinson College, Carlisle, and became professor of Natural Science there in 1846. In 1850 he was elected assistant-secretary of the Smithsonian Institution at Washington, and in 1878 secretary. He translated from the German and edited the *Iconographic Encyclopædia;* and published Reports on the collections in natural history made by Stansbury, Gilliss, Marcy, and others in the government explorations. In connection with John Cassin, he published *The Birds of North America* (2 vols. 1860), and *The Mammals of North America* (1859); and with Dr Brewer and Professor Ridgeway, *History of the Birds of North America* (5 vols. 1870–84). Dr Baird published numerous other papers upon mammals, birds, reptiles, and fishes. In 1871 he was appointed by the president United States Commissioner of Fish and Fisheries, and in that capacity he accomplished much towards the advancement of fisheries and fish-culture, accounts of the results of this work being embodied in annual Reports. His especial work, while assistant-secretary of the Smithsonian Institution, was the development of the National Museum, which made its beginning under his direction in 1850. A bibliography of his publications, with a biographical sketch, constitutes Bulletin No. 20 of the National Museum. He died 19th August 1887. See his *Life* by W. H. Dall (1915).

Baireuth, or (officially) BAYREUTH, capital of the Bavarian province of Upper Franconia, 43 miles NNE. of Nürnberg by rail. Beautifully situated on the Red Main, it has broad, well-paved streets, interspersed with groves, promenades, fine gardens, and public fountains. Its principal buildings are the old palace, dating from 1454; the new palace (1753), containing a gallery of paintings; and the old opera-house (1748). A magnificent 'national theatre' for the performance of Wagner's music, finished in 1875, was in the following year opened with a grand representation of his *Ring of the Nibelungen.* On 14th February 1883, the great master (who died at Venice) was buried in the garden of Wahnfried, his villa here. Jean Paul Richter died here in 1825, and a monument has been erected to his memory. Baireuth's chief articles of industry are cottons, woollens, linen, leather, furniture, tobacco, parchment, and porcelain. An active trade is also carried on in grain and horses. Pop. (1925) 35,306, who are mostly Protestants. The witty and accomplished Wilhelmina, Margravine of Baireuth (1709–58), was the favourite sister of Frederick the Great, and in 1731 was married to Frederick, Margrave of Baireuth and Anspach. Her *Memoirs,* first published in 1810, were translated into English by the Princess Christian in 1887.

Bairns' Part. See LEGITIM.

Baitul. See BETUL.

Baize (old Fr. *baies*), a coarse woollen cloth with a long nap, used mainly for coverings, curtains, linings, but in some countries for clothing.

Baja, a market-town of Hungary, on the Danube, 90 miles S. of Budapest. It is celebrated for its annual swine fair, and its trade in grain and wine. Pop. 20,000.

Bajan. See BEJAN.

Bajaur, a small territory (375 sq. m.) in the NW. Frontier Province of India, bordering on Swat and Afghanistan.

Bajazet I., or BAJAZID, Sultan of the Turks, was born in 1347, and in 1389 succeeded his father, Murad I., who was slain on the battle-fields of Kossovo. He inaugurated his rule by strangling his younger brother Yakub, lest he should dispute the succession. In three years he conquered Bulgaria, with parts of Serbia, Macedonia, and Thessaly; he also subdued the greater part of Asia Minor. From the rapidity with which these extraordinary conquests were effected, he received the name of Ilderim—that is, 'Lightning.' He even blockaded Constantinople itself for ten years, thinking to subdue it by famine. To rescue this city, King Sigismund of Hungary (afterwards emperor of Germany) assembled a large army, including 2000 French nobles, and laid siege to the Bulgarian city of Nikopolis, on the Danube. Bajazet hastened to meet him, and gained a decisive victory over the allied Hungarians, Poles, and French (1396). Sigismund escaped, but the greater part of the French, through whose impetuosity the battle was lost, were taken prisoners, and were nearly all executed. Bajazet would now have entirely destroyed the Greek empire, if he had not been prevented by Timur, who attacked his possessions in Asia Minor, and completely defeated him (1402) near Angora. Bajazet himself fell into the hands of the conqueror, who treated him with great generosity. The story popularised by Marlowe and Racine, that he was carried about imprisoned in a cage, is without historical foundation, and is probably based on a mistranslation of a Turkish word signifying 'litter.' Bajazet died in 1403, in the camp of Timur. He was succeeded in the government by his son Soliman I. Bajazet was honourably distinguished by his efforts to improve the administration of justice.

Bajazet II., son of the Sultan Mohammed II., the conqueror of Constantinople, was born in 1447, and ascended the Ottoman throne after his father's death in 1481. His reign, which lasted 32 years, was a succession of uninterrupted wars against

Hungary, Poland, Venice, Egypt, and Persia, which were carried on with various success, and which served on the whole to establish the Ottoman power. The submission Bajazet always showed to the wishes of the Janizaries (q.v.) laid the foundation of the later importance of that body. The last years of his reign were much disturbed by disputes between his three sons about the succession to the throne. Influenced by the preference shown by the janizaries for his youngest son Selim, Bajazet abdicated in his favour, but died before he could reach the place of his voluntary exile, in the neighbourhood of Adrianople, in the year 1512. Bajazet was a friend to the dervishes, at the same time liberal and fond of pomp and splendour. Many of the most beautiful mosques in the Ottoman empire were built by him.

Bajimont's Roll. See BAGIMONT'S ROLL.

Bajmok, a town of Yugoslavia, in the Bacska, 16 miles SW. of Subotica or Theresiopel; pop. 8000.

Bajocco, or BAIOCCO (pl. BAJOCCHI), was a copper coin in the Papal States, value nearly a halfpenny. It was 1-100th of the scudo, which was equal to 4s. 3¼d.

Bajus, MICHAEL (properly, De Bay), a great Catholic theologian in the 16th century, was born in 1513 in Hainault. He studied at Louvain, became professor of Theology there in 1551, and went as a deputy to the Council of Trent in 1563. He was a devoted student of St Augustine, and his theology was based on that father's views of divine grace, of sin, and of the absence of merit in all good works. His assertion of the inability of the human will, left to its own freedom, to do anything but sin, with his application thereof to the dogma of the immaculate conception, soon drew on him the accusation of heresy. Seventy-six of his propositions were condemned by a papal bull in 1567. He submitted, but was supported by his university, which appointed him its chancellor in 1578. Meantime he maintained a long controversy with the Jesuits, and in 1587 denounced thirty-four of their theses as Pelagian and immoral. He died December 16, 1589. He may be regarded as a precursor of the Jansenists. See Linsenmann, *Michael Bajus* (1867); and Seeweg in Hauck-Herzog (1897).

Bajza, JOSEPH, a Hungarian poet and prose-writer, was born January 31, 1804, at Szücsi, in Hevés. After his studies at Pesth, he practised there as an advocate, and early gained by his first volumes of verse, published in 1835, a place among the best Hungarian lyric poets. As a contributor to the critical journals, and as editor of the *Figyelmezö* (Observer) from 1837–43, he exercised a beneficial influence on the rising literature of Hungary. He translated a collection of foreign dramas (1830); and published an Historical Library (from the German) in 6 vols., a Modern Plutarch, and a Universal History. He died at Pesth, 4th March 1858.

Bakacs, THOMAS, Hungarian statesman, was the son of a peasant, born about the middle of the 15th century. He held several bishoprics in succession, became chancellor of the kingdom, and finally archbishop and cardinal. He preached a crusade against the Turks; but his army of peasants and vagabonds turned their arms against the nobility, and a bloody civil war ensued. He died in 1521, leaving enormous wealth.

Bakalahari, the name of a Bechuana tribe resident in the Kalahari desert, between the Orange River in the south and Lake Ngami in the north, in Africa. They show some disposition for settled life and industrial pursuits, cultivating the soil, and rearing goats.

Bakar. See BUCCARI.

Bakarganj, or BACKERGUNGE, a district in the Dacca division of Bengal, contains 4542 sq. m., and is watered at once by the lower streams of the Ganges and the Brahmaputra. It is typical of the alluvial delta formed by the great river systems of eastern Bengal. In the south of the district are the forest tracts of the Sunderbunds. Barisal, the headquarters, on the west bank of Barisal River, is the only considerable town. Bakarganj, the former capital, is now in ruins. The population is over 2,400,000.

Bakau, or BACAU, a Rumanian town, on the river Bistritza, 187 miles N. of Bucharest by rail, produces petroleum and salt; pop. 20,000.

Bakchiserai (Turkish, 'Garden Palace'), a town in the Russian autonomous republic of Crimea, the residence of the ancient princes of the Crimea, stands in a deep limestone valley, 15 miles by rail SW. of Simferopol. Population, 15,000, mainly remnants of the old Tatar inhabitants. The palace (1519) of the khans has been completely restored by the Russian government in the oriental style.

Bake, JAN, a distinguished classical scholar, was born at Leyden in 1787; from 1817 to 1857 was professor of Greek and Roman literature in the university there, and died 26th March 1864. He edited works by Cicero, Longinus, and others; and wrote many admirable critical papers.

Bakel, a town with a strong fort, in the E. of the French colony of Senegal, on the left bank of the Senegal River. Pop. 3000.

Baker, MOUNT, an active volcano in the NW. of the state of Washington, U.S., in the Cascade Range, a continuation of the Rocky Mountains, 20 miles from the Canadian frontier. It is in eruption from time to time, and was very active in 1880. Its height is 11,000 feet.

Baker, HENRY, naturalist, born in London in 1698, from a bookseller's apprentice turned a teacher of deaf-mutes, and, making a largish fortune, in 1729 married Defoe's youngest daughter. In 1740 he was elected a Fellow both of the Royal Society and of the Society of Antiquaries. He contributed many papers to the Transactions of the former society, received its Copley gold medal (1744) for his microscopical experiments, and published a philosophical poem on the *Universe*. He was founder of the Bakerian lectureship, and died 25th November 1774.

Baker, JOHN GILBERT, botanist, was born at Guisborough, Yorkshire, 13th January 1834, and in 1866 was appointed assistant-curator at the herbarium at Kew. He was lecturer to the London hospital, and to the Apothecaries' Company, and in 1890–99 was keeper of Kew herbarium. He was a Fellow of the Royal and Linnæan Societies. His voluminous writings include works on the flora of districts so diverse as the north of England, Madagascar, and Brazil; and from his pen came both popular monographs and scientific catalogues of high value. He died in August 1920.

Baker, SIR RICHARD, author of the *Chronicle of the Kings of England*, a work without which no country gentleman's library was complete, and often referred to by 'Sir Roger de Coverley.' Notwithstanding its reputation, however, the book had no lack of errors, and now is all but forgotten. Its author, born in Kent about the year 1568, was educated at Oxford University, and was knighted in 1603. In 1620 he was high-sheriff of Oxfordshire; but in 1635 he was thrown into the Fleet Prison for debt which his wife's family had contracted, but for which he had become responsible. Here he wrote his *Chronicle*, first published in 1643,

besides several pious works of less note. He died a prisoner, in great poverty, in 1645.

Baker, Sir Samuel White, an African traveller, born in London, June 8, 1821, was educated at a private school and in Germany, and at an early age went to Ceylon. There, along with his brother, he established in 1847 an agricultural settlement and sanatorium at Newera Ellia, 6200 feet above sea-level. He afterwards superintended the construction of the railway which connects the Danube across the Dobrudja with the Black Sea. In 1860 he married a young Hungarian lady of great talent and enterprise, and in company with her he undertook a journey of exploration at his own cost for the discovery of the Nile sources. They set out from Cairo in April 1861, reaching Khartum in June 1862. When Baker quitted Khartum to ascend the White Nile, he had an escort of 90 persons, 29 camels, horses, and asses, and three large boats. They had only been at Gondokoro a fortnight, when they were joined by Speke and Grant coming from the south, who told Baker of the Victoria Nyanza, which they had discovered; they also mentioned that the natives had described to them another great lake, named Luta Nzige. Baker resolved to reach this lake; and after many adventures, they arrived, on 14th March 1864, on the top of lofty cliffs, from which they beheld the vast inland sea to which Baker gave the name of the Albert Nyanza. He reached Gondokoro on March 23, 1865. In 1869–73 he commanded an expedition, organised by the pasha of Egypt, for the suppression of slavery and the annexation of the equatorial regions of the Nile Basin. After the British occupation of Cyprus in 1879, he made a thorough exploration of the island, and afterwards journeyed through Syria, India, Japan, and America. Baker was knighted in 1866; on his return from the Nile, he received medals from the Royal Geographical Society, and the French Geographical Society. He was F.R.S., and a fellow of other learned societies; and had numerous foreign distinctions. He died at his home near Newton-Abbot, 30th December 1893. He published *The Rifle and the Hound in Ceylon* (1854); *Eight Years' Wanderings in Ceylon* (1855); *The Albert Nyanza* (1866); *The Nile Tributaries of Abyssinia* (1867); *Ismailia* (1874); *Cyprus* (1879); and *Wild Beasts and their Ways* (1890). See his Life by Murray and Silva White (1895).

Baker, Thomas, antiquary, was born at Lanchester, Durham, in 1656, and educated at St John's College, Cambridge. As a non-juror, he lost in 1690 the rectory of Long-Newton, and in 1717 his fellowship, but he spent the last fifty years of his life at his old college, dying there in 1740. He published *Reflections on Learning*, and made valuable MS. collections on the history of the university, amounting to 42 folio volumes; whilst his *History of St John's College* was edited by Professor Mayor in 1867.

Bakewell, an ancient market-town in Derbyshire, on the left bank of the Wye, 25 miles NNW. of Derby. It has warm baths and a mineral spring, a fine but over-restored church, with an 8th or 9th century cross, and charming environs, Haddon Hall and Chatsworth being not far off. Pop. (urban district) 3000.

Bakewell, Robert, grazier, was born in 1725 at Dishley, Leicestershire, and died in 1795. His fame rests on his successful efforts to improve the breed of domestic animals. His reputation was so great as a breeder of sheep, that he received the almost fabulous sum of 1200 guineas for one season of a ram. The long-horned breed of cattle which he produced is still remembered as the Dishley or New Leicestershire breed. His horses were also famous, and almost as profitable to him as his sheep. One of his objects was to produce a breed of animals that would fatten on the smallest quantity of food. Yet he was bankrupt in 1776.

Bakhmut, renamed Artemovsk in 1924, a town of Ukraine, on a tributary of the Donetz. There are large works for melting tallow and wax, salt-springs, and near by are valuable coal-mines and alabaster quarries. Pop. 37,000.

Bakhtegan, or Niris, a salt lake in the Persian province of Farsistan, 47 miles E. of Shiraz, 74 miles long, and 5100 feet above the sea.

Bakhtiari, a nomad tribe of Persia (q.v.), akin to the Lúurs, occupying the mountainous Bakhtiari country to the west of Isfahān.

Baking is the mode of cooking food in an air-tight chamber or oven. The oven that forms part of a kitchen-range is simply an iron chamber, with flues for conveying the heated gases of the fire round it. In baking strictly so called, the oven is kept close, so that the steam and aroma are confined; but a great improvement is effected if a current of air is produced by ventilators. The rank taste that often characterises baked dishes is thus avoided; and the process may then be called *oven-roasting*. Ovens are frequently heated by gas. See also Oven, Bread; and for baking in another sense, Bricks, Pottery.

Baking Powder is essentially a mixture of tartaric acid and bicarbonate of soda. These are carefully dried and sifted together, some flour being usually mixed with them to dilute the strength. When it is added to flour in the manufacture of bread or scones, carbonic acid gas is liberated by the action of the water which is used, and this blows or puffs up the doughy mass, giving it the requisite lightness. Frequently the bicarbonate of soda is alone used, buttermilk or the natural acidity of the dough being depended on to evolve the gas. See Bread.

Bakony Wald (Forest of Bakony), a densely wooded hill-country of Hungary, extending from Lake Balaton northward to the Danube, and dividing the great and little Hungarian plains. Immense herds of swine are annually driven hither to feed upon the mast of the forest. The swineherds furnished those notorious robbers who play so important a part in the ballads of the Hungarian people, and in the imagination of travellers. Its length is about 55 miles, its breadth 25 miles.

Bakshish. The ordinary meaning of this word in Persian is a present; but in the East, in modern times, it has acquired the special signification of gratuity (Fr. *pourboire*, Ger. *Trinkgeld*).

Bakst, Léon (1866–1924), born of Jewish extraction at St Petersburg, lived in Paris. After 1909 he became known as a brilliant designer and colourist by his settings for the Russian Ballet and the plays of D'Annunzio, and others. He achieved a directness and a simplicity by means of gorgeous broad effects of massed colours.

Baku, capital of the Azerbaijan Republic, a great port on the Apsheron Peninsula, on a crescent-shaped bay in the Caspian Sea. The bay, which is about 7 miles from point to point, and 15 in circumference, is protected across the mouth by an island, which provides shelter and anchorage for shipping. Since 1883 it has been connected by rail with Tiflis, and so with Poti and Batum on the Black Sea, 561 miles distant; and since 1887, by the North Caucasus Railway, with Novorossisk on the Black Sea. The whole soil around Baku is impregnated with petroleum, which, monopolised till 1872, now forms the staple branch of its industry. Some of the fountains ignite spontaneously, and this natural phenomenon has

caused Baku to be esteemed a holy city by the Parsees, many of whom resorted to it from very long distances (see ATESHGA), although commerce has now invaded the sacred shrine. There is evidence that petroleum has been flowing from the Apsheron Peninsula for 2500 years. Most of the petroleum-wells about Baku are situated on the Balakhani plateau, 8 or 9 miles off, at Bibi Eibat (2 miles) and Surakhani (12 miles). Lines of pipe carry the oil into the 'black town' of Baku, which is full of oil-refineries emitting vast volumes of smoke, black and greasy buildings, and pools of oil refuse. One prolific well, tapped in September 1886, began to spout oil with extraordinary force, deluging the whole district. Nothing could be done to stop the outflow, which on the eighth day had reached a daily rate of 11,000 tuns, or more than the entire produce of the world at the time. Another gigantic naphtha fountain burst out in March 1887, rising to a height of 350 feet, and after forming an extensive petroleum lake, forced its way into the sea. Great and destructive fires have occasionally occurred. The oil is conveyed by pipe to Batum, or carried by tank-steamers and railway cars. How rapidly the industry grew when communication was established with the outside world may be judged from the fact that the number of drilled wells increased from 1 in 1871 to 400 in 1883, 1321 in 1900. It suffered a set-back in the revolutionary troubles, but went forward again after nationalisation in 1920. Cotton, silk, opium, saffron, and salt are exported. The Arabian Masûdi is the first who mentions Baku, about 943, and he gives an account of a great volcanic mountain in its vicinity, which is now extinct. Baku was taken by Russia from the Persians in 1806. The marvellous development of the petroleum trade has revolutionised the place. There is a fine railway terminus near the town. The harbour, which is strongly fortified, was one of the chief stations of the Russian navy in the Caspian, and is of great importance as a centre of trade. Shipbuilding is carried on. Pop. in 1870, about 15,000, mainly Persians and Armenians; (1926) 446,832, mainly Tatars. In 1905 there were bloody riots between Tatars and Armenians. Many wells were burnt out and trade dislocated. Baku was capital of a government of Russian Transcaucasia, which, with Elizabetpol, became in 1918 the republic of Azerbaijan (q.v.), with Baku as capital. In 1918–20 British, Turks, and Russians held it in turn.

Bakunin, MIKHAIL, a leading propagator of Anarchism (q.v.), was born near Moscow in 1814 of an aristocratic family, and entered the Russian army, but during service in Poland conceived such a hatred of despotism that he resigned his post. After 1846 he visited Germany, and also Paris, where he met Proudhon and George Sand. He took part in the German revolutionary movement of 1848–49, especially at Dresden, and was condemned to death. He was, however, given up to Russia, where he spent several years in prison, and was next sent to Siberia in 1855, but managed to escape in an American ship to Japan, leaving behind him wife and child, and arrived in England in 1861. In 1865 Bakunin was in Italy diffusing his views. In 1869 he founded the Alliance of the Social-democracy, which dissolved the same year in order to enter the International; in September 1870 he attempted a rising at Lyons, with an aim somewhat similar to that of the Paris Commune in 1871. As the leader of anarchism, Bakunin was in the International the opponent of Karl Marx; but at the Hague Congress in 1872, he was outvoted and expelled from it. He died at Berne in 1876. Bakunin was most active as an agitator. He wrote several works, in which atheism, materialism, and anarchism are advocated in the frankest and most uncompromising manner.

Ba'la, a town of Merionethshire, North Wales, near the foot of Bala Lake, 12 miles SW. of Corwen by rail; pop. 1400. Bala Lake measures 4 miles by 1 mile, and sends off the Dee from its foot. From Lake Vyrnwy (q.v.), 10 miles to the south of Bala, Liverpool obtains water.

Ba'laam, the name of a prophet not of Hebrew blood, mentioned in Numbers xxii.–xxiv. According to the story, Balak, king of the Moabites, alarmed at the irruption of the Hebrews into his territories, formed a league with the Midianites, and sent messengers to Balaam with the rewards of divination in their hands. Refused permission from God, he consented to go only after a second summons from the king. On the way the angel of the Lord met him. The prophet's ass saw the apparition, and three different times turned aside out of the way in terror. Balaam, not seeing the angel, beat his ass three times, whereupon the beast opened his mouth, and 'spake with man's voice, and stayed the madness of the prophet.' At last his eyes were opened to see the angel, and he was denounced for his sin. Three different times he tries to curse Israel for Balak, but as often the cursings turn to blessings in his mouth, and he breaks out into the loftiest strains of prophetic poetry in praise of the glorious destiny of Israel. But though he could not belie the prophetic function by cursing the Israelites, he succeeded in causing them for a time to forfeit the favour of Jehovah, by leading them into sin through a special temptation which Balak and the Moabites on his advice spread before them. The prophet perished in the vengeance taken by the command of Jehovah upon the sinners. Such is the strange story of the true prophet 'who loved the hire of wrong-doing,' and who is taken in the Scriptures as the constant type of those men who prostitute their powers and hold the truth in unrighteousness, receiving the wages thereof.

Bala Beds. The rocks of the Bala district, North Wales, contain two limestones, separated by some 1400 feet of arenaceous and slaty strata. The lower limestone (25 feet) is called the Bala limestone, and has been followed over a considerable area; the upper, or Hirnant limestone, is local. The lower, or Bala limestone, is supposed to be the same as the Coniston limestone of Westmorland. Bala beds form a group of the Lower Silurian or Ordovician. In the Snowdon region they attain a great thickness, and show intercalated sheets of felsitic lava and tuff, bespeaking long-continued volcanic action. See SILURIAN.

Balachong, a condiment much used in China for eating with rice, is made of putrid shrimps or small fish pounded with salt and spices and dried.

Balæ'na. See WHALE.

Balæniceps ('whale-headed'), or Shoe-billed Stork, is a gigantic grallatorial bird found only on the Upper Nile. It has a large hooked very broad and flat bill, resembling that of the Boat-bill (q.v.), and lives mainly on lizards and other reptiles. The *Balæniceps rex* belongs to the *Umbres* subdivision of the stork family.

Balænop'tera. See RORQUAL.

Balaghat' ('above the Ghats'), the name given to a large tract of elevated country in the south of India, extending from the rivers Tumbuddra and Krishna in the north to the farthest extremity of Mysore in the south. Also the name of a British district in the Central Provinces; area, 3132 sq. m.; pop. 400,000. See also BERAR.

Balahissar, a village 80 miles south-west of Angora, in Asia Minor, on the site of the Phrygian (later Galatian) *Pessinous.* The ancient town

was famous for its worship of Cybele, whose statue (to obey an oracle) was removed to Rome in 204 B.C. Among the fragments of marble columns, friezes, &c. rise the ruins of her gorgeous temple, a theatre in partial preservation, a castle, and a circus.

Balakirev, Mili Alexeivich, Russian composer and pianist, born 31st December 1836 (O.S.) at Nijni-Novgorod, lived and studied with Ulibishev, biographer of Mozart, and going to St Petersburg at the age of eighteen, became leader of the national Russian movement in music. Cui, Mussorgsky, Rimsky-Korsakov, and Borodin were his disciples, and Tchaikovsky was influenced. In 1862 he established, with others, a Free School of Music which gave important concerts. In 1869 he became conductor to the Imperial Musical Society and to the Tsar. He died in 1910. His compositions, few in number, include orchestral music (*Thamar, Russia,* &c.), songs, and pianoforte music.

Balakla'va, a small Greek fishing-village and health-resort in the Crimea, 8 miles SE. of Sebastopol, from which it is separated by a rocky peninsula. The harbour, which affords secure anchorage for the largest ships, till 1860 was a naval station. It is perfectly landlocked, the entrance being so narrow as scarcely to admit more than one vessel at a time. To the east, overlooking the bay from a rocky eminence, are the ruins of a Genoese fortress. Balaklava is the *Symbolōn Limēn* of Strabo, and the *Cembalo* of the Genoese (1365-1475), who were expelled by the Turks, as these were in turn by the Russians, when Catherine II. made it the seat of a Greek colony. From September 1854 to June 1856 it was the British headquarters during the Crimean War (q.v.), and the famous charge of the Six Hundred (25th October 1854) has made the name glorious as Thermopylæ.

Balalaika, a Russian peasants' musical instrument of the guitar type, commonly three-stringed.

Balance (from Latin *bilanx*), an instrument for ascertaining the mass of bodies. The ordinary balance consists of a symmetrical lever called a beam, supported in the middle, and having dishes or scales suspended from either extremity. As it is of importance that the beam should move easily round its support, it rests on polished agate or steel planes, by means of knife-edges of tempered steel, which project transversely from its sides, and serve as the axis of rotation. By this arrangement the surface of contact is practically reduced to a line, and the friction of the axis of the beam on its support almost entirely obviated. The scales are hung by means of chains or cords attached to hooks, which rest on knife-edges turned upwards instead of downwards as in the first case. The essential requirements of a balance of this description are: 1st, That the beam shall remain in a horizontal position when no matter is in either scale; 2d, That the beam shall be a lever of equal arms, or have the distances between the central knife-edge and those at either end exactly the same; and 3d, That the balance shall possess *sensibility*—i.e. shall turn readily from its horizontal position when there is a slight excess of matter in one of the scales. To insure the first of these conditions, it is necessary that the centre of gravity of the beam lie vertically below the point of support when the beam is horizontal. When such is the case, the centre of gravity at which the weight of the beam may be considered to act oscillates as in a pendulum round the point of support, and always comes to rest right under that point, thus restoring to the beam its horizontal position when it has been tilted out of it. If the centre of gravity were above the point of support, the beam would topple over; and if it coincided with that point, there being no restoring force, the beam would occupy indifferently any position into which it was thrown, the balance in both cases being useless. That a balance possesses the second of the above conditions, is ascertained by putting into the scales masses which keep the beam horizontal, and then transposing them, when, if it still remain so, the lengths of the arms are equal. Should the arms be of different lengths, a less mass at the end of the longer arm will balance a larger mass at the end of the shorter arm (see Lever); but when transposed, the larger mass having the longer arm, and the smaller mass the shorter, the beam can no longer remain horizontal, but will incline towards the larger mass. A balance with unequal arms is called a false balance, as distinguished from an equal-armed or just balance. When employing a false balance, it is usual to place a body in both scales, and take the arithmetical mean—that is, half the sum—of the apparent masses for the true mass. This is near enough to the truth when the apparent masses differ little from each other; but when it is otherwise, the Geometrical Mean (q.v.) must be taken, which gives the exact mass in all cases.

The third requisite—the sensitiveness—depends upon the weight of the beam, the position of its centre of gravity, and the length of its arms. Let ABD (fig. 1) represent the beam of a balance, C the point of suspension, G the centre of gravity, and ACB the straight line joining the knife-edges, which may be taken as the skeleton lever of the balance. We shall here confine our attention to that construction where the three knife-edges are in a line, because it is the most simple, and at the same time the most desirable. We may, without altering the principles of equilibrium, consider the

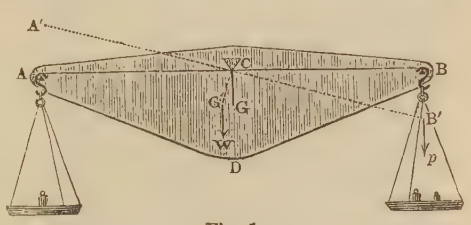


Fig. 1.

beam reduced to the lever AB, and embody its weight in a heavy point or small ball at the centre of gravity, G, connected with C by the rigid arm CG. The weights of the scales and contained equal masses act at A and B, and have no influence on the position of the beam since the arms are equal. If a small additional weight, *p*, therefore, act at B, the position of the beam is determined by its rotating tendency (moment) round C, and the counter-rotating tendency of the weight of the beam, W, acting at G. The question of sensitiveness is thus reduced to the action of the crooked lever GCB, with *p* acting at one end, and W at the other. The relations of the arms and forces of a crooked lever will be found under Lever. It is only necessary here to state, that the moment of the weight acting at the end of a crooked lever, increases with its size, the length of its arm, and the smallness of the angle which that arm makes with the horizontal line passing through the fulcrum. Consequently, *the longer the arms of a balance are, all other things being the same, the greater will be its sensitiveness.* Also, *the nearer the centre of gravity of the beam is to the point of support, the greater will be the sensitiveness of the balance;* and, lastly, *the smaller the weight of the beam, the greater will be the sensitiveness of the balance.*

In the construction of the balance, it is a matter of importance to have the sensitiveness independent of

the weight of the scales and contained masses, so that when it is heavily loaded a small weight will produce the same inclination as when it is not loaded at all. This condition is implemented, as we have already shown, when the three knife-edges are kept in the same straight line. If the line joining the two terminal knife-edges lie below the point of suspension, then the centre of gravity of the equal masses will, upon the turning of the beam, be forced from below that point, and will accordingly have a tendency to resume its former position. The equal weights thus counteract to some extent the effect of the additional weight, and their influence in this way will be all the greater as they themselves increase.

When a balance is very sensitive, the beam keeps oscillating for a considerable time from one side to the other of the position in which it finally settles. The stability, or the tendency of the beam to come quickly to rest, depends on requirements nearly the opposite of those which conduce to sensitiveness. In the construction treated of above, the stability increases with the moment of the weight of the beam acting at G round C, so that it thus increases with the weight of the beam, and the distance of the centre of gravity from the point of suspension. The stability is also increased, as already shown, by having the line joining the scale knife-edges below the point of support.

Fig. 2 is the representation of one form of the delicate balances employed in physical and chemical

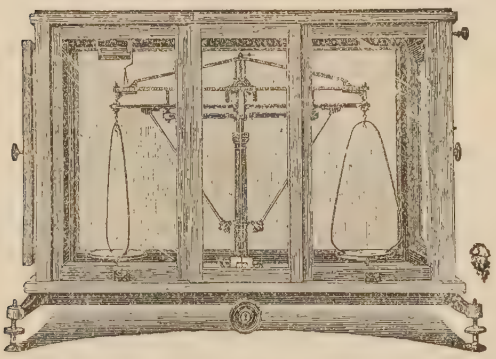


Fig. 2.

researches. The beam is constructed of aluminium, so as to combine lightness with strength, and rests by a fine agate knife-edge on an agate plane. The pans are also hung on agate knife-edges and planes. In the upper part of the beam is a small body moving on a screw, so that the sensitiveness may be increased or diminished according as the body is raised or depressed. In order that the knife-edges may not become blunted by constant contact with the supporting planes, a cross-bar, with projecting pins, is made to lift the beam from the plane, and the pans from the beam, and sustain their weights when the balance is not in play. The beam is divided by lines marked upon it into ten equal parts, and a small piece of fine wire bent into the form of a fork, called a rider, is made to slide along to any of the divisions. If the rider be, for instance, $\frac{1}{10}$ of a grain, and if, after the mass of a body is very nearly ascertained, it brings the beam, when placed at the first division next the centre, exactly to its horizontal position, an additional mass of $\frac{1}{100}$ of a grain will be indicated. As the beam takes some time before it comes to rest, it would be tedious to wait in each case till it did so, and for this reason a long pointed index is fixed to the beam below the point of suspension, the lower extremity of which moves backward and forward on a graduated ivory scale, so that when the index moves to equal distances on either side of the zero point, we are quite certain, without waiting till it finally settles, that the beam will be horizontal. When great accuracy is required, a microscope or lens is used to read the oscillations. The balance is surrounded by an air-tight case to keep out dust, &c.; sliding doors giving access to the pans, and the little rider being manipulated from the outside. A small dish of strong sulphuric acid or dry carbonate of potash is kept inside to keep the atmosphere of the case dry. Even with the best mechanical skill, no balance can be made whose arms are absolutely equal; and to remedy this the method of 'double weighing' is resorted to, when the utmost accuracy is demanded. This consists in placing the body in one scale, and some substance in the other, until exact equilibrium is obtained, then removing the body, and putting in its place known masses (weights) which produce equilibrium again. The mass of the body must evidently be equal to the sum of the known masses.

The Roman balance, or *Steelyard* (Ger. *Schnellwage*), is more portable than the ordinary balance.

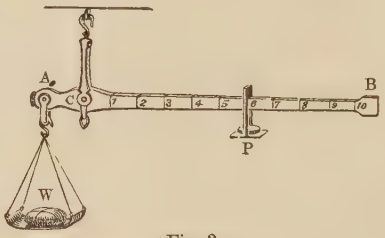


Fig. 3.

Its construction is indicated in fig. 3. AB is the beam, and C is the fulcrum. Taking the particular case indicated in the diagram, it is evident from the principles of the lever that the mass W is six times the mass P. As the steelyard is ordinarily made, the long arm is heavier than the short one, and therefore the graduation commences from a point between A and C, and not at C.

The *Bent Lever Balance* (Fr. *peson*, Ger. *Zeigerwage*), shown in fig. 4, is a lever of unequal arms AC, CB, moving round the pivot C, having a scale, Q, attached to the shorter arm AC, and a fixed mass, W, to the longer arm CB. The longer arm ends in a pointer moving in front of a fixed graduated arc. When a body is put into the scale, the pointer rises from the bottom or zero point of the arc, and rests opposite the mark corresponding to its weight. The higher the mass W rises, the greater becomes the moment of its weight, and the greater must be the mass whose weight it balances. The arc is generally graduated experimentally.

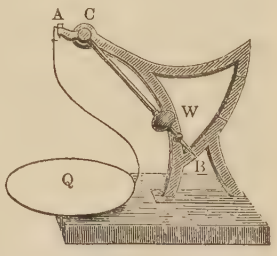


Fig. 4.

For other weighing apparatus, see WEIGHING-MACHINES; and for the law of unjust weighing, see WEIGHTS AND MEASURES.

Spring-balance.—The commonest form of the spring-balance, known as Salter's Balance, is shown in fig. 5. It consists of a spring in the form of a cylindrical coil in a metal case, which it about half fills when at rest. The upper end of the spring is fixed through the top of the case to a ring by which

it is suspended for use. To the lower end of the spring a rod is attached having an index-pointer working through a slot in the front plate of the case. The substance to be weighed is fixed on a hook at the bottom end of the rod, and the weight as indicated by the stretching of the spring is read off on the scale (a part of the front plate has been removed in the figure, to show the spring inside). Another common form, called the Household Balance, is made to stand on a table, and has a dial-plate on which an index-finger registers the weight. The article to be weighed is put into a pan on the top of the balance. From the under side of the pan a rod goes down into the case; a cross bar at the bottom of this rod is attached to the lower ends of two coiled springs, the upper ends of which are fixed. A rack on the side of the rod, acting on a toothed wheel in conjunction with a system of levers, transfers the action of the rod under the weight in the pan to the index-finger, which registers the amount on the dial-plate. Spring-balances are also made in a great many other forms, and for various purposes, such as letter balances, parcel balances, &c.; but the principle in all is the same—viz. the stretching of a spiral spring. They have no pretension to great accuracy, but are in extensive use for ordinary purposes, and have the advantages of being portable and having no weights to get lost. The spring-balance is also used as a Dynamometer (q.v.). It really measures weight directly, and therefore mass indirectly, since the two are proportional.

Fig. 5.

Balance of Power, that state of things in which no state is permitted to have such a preponderance as to endanger the independence of the others. The Greeks acted upon it more or less distinctly with regard to the relations of such states as Sparta, Athens, and Thebes. It was, however, more distinctly avowed as a motive of political conduct, and more systematically acted upon, after the time of Charles V. For nearly a century and a half the house of Hapsburg, of which Charles was the first great chief, seemed to strive at universal empire. The Thirty Years' War was waged not only to save Protestantism, and to prevent Austria from becoming master in Germany, but to hinder the predominance in Europe of a single crown. The motive of preserving the balance of power came most distinctly into the foreground in those unions which England, Holland, and Austria repeatedly formed against the menacing schemes of Louis XIV. for acquiring supreme power in Europe. It was the same cause that broke up the most dangerous (for Louis) of these coalitions; for in the war of the Spanish Succession, when the Hapsburg pretender to the Spanish throne became, by the death of Joseph I., sovereign of Austria and German emperor, and the power which, in the hands of Charles V., had menaced the equilibrium of Europe, was thus likely to be again wielded by one man, England withdrew from the coalition, and thus saved Louis from a decided overthrow. The aggressive policy of Napoleon called all the nations of Europe to arms against him in the name of the balance of power; and in readjusting the map of Europe, the balance of power was often invoked to cover the jealousy which resisted not a few claims to restitution of territory. For some time the balance of power in Europe was embodied in a pentarchy or virtual leadership of the five great powers, who mutually watched one another's movements. The formation of the kingdom of Italy increased the number of great powers to six. The rise of Germany since the war of 1870–71 gave it a leading place in maintaining the European balance. The great development of Russia, and the continuity of her aggressive policy in the East, formed a most important element in the European equilibrium. As the doctrine of non-intervention gained ground, the idea of a balance of power became less esteemed in Great Britain. It prevailed chiefly after the rise of the great centralising states under absolute dynasties at the close of the feudal period, and the true welfare of peoples has been again and again sacrificed to the balance of power and to dynastic interests therewith connected. Yet so far as the maintenance of the balance has tended to protect the independence of European states against great aggressors, and to prevent the predominance of a single despotic empire, it has been beneficial. And the subject is greatly widened and complicated by the extension of European influence and European possessions all over the world. Problems in this connection (transformed by war and revolutions since 1914) have been the Eastern Question (q.v.), the rivalry of Russia and Britain in the East, the difficulties as to Egypt and the Suez Canal, the rise of Germany as a great power, and the entry of China and Japan into the circle of world-politics. The League of Nations seeks a different way, and the grouping of states in rival alliances is now frowned upon. Yet, though the idea of a balance of power in its old form has fallen into disrepute, it may still be considered a working factor in politics. Groups have been formed such as the Little Entente of Czechoslovakia, Rumania, and Yugoslavia. And though the principle of self-determination has been admitted, its application has sometimes been prohibited in the name of security. See MONROE for the 'Monroe Doctrine.'

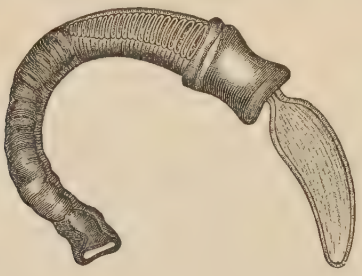
Balance of Trade is a term specially significant in the 'mercantile system' of political economy, which looked upon the possession of gold as the grand aim; so that it not unnaturally came to be a maxim that a nation becomes richer in proportion as the money-value of its exports exceeds that of its imports; the excess being paid in gold, was thought to be just so much added to the national wealth. Now, the difference between the money-value of the exports and imports of a state is called the 'balance of its trade;' and by the adherents of the mercantile system, this balance was said to be 'in favour' of the country or 'against' it, according as the exports or the imports showed the excess.

As a practical result of this theory, every sort of device was adopted in order to bring out a favourable balance. Laws were enacted prohibiting importation of foreign manufactures, or imposing high duties upon them, and giving premiums and other protective encouragements to exportation. The aim of commercial legislation, in short, was to promote the flow of the precious metals to one's own country, and to keep them there. The fallacies of the balance of trade were obviously due to a mistaken conception of the nature of wealth, and must therefore be traced to the errors of the Mercantile System (q.v.).

Connected with this, though very different, are the recent discussions regarding the balance of trade. For many years the imports of Great Britain have in value greatly exceeded the exports. Will not this tend eventually to the national impoverishment, especially as so large a proportion of

the imports is devoted to consumption as food and luxuries? With reference to this question, the following points should be considered: That a great proportion of the revenue of this country is drawn from investments abroad, and with these investments we can pay largely for our imports; also that an important part of our business with foreign countries consists in a carrying trade, from which we draw considerable profits. In point of fact, our national wealth is continually growing, though doubtless Britain has reached a stage when an increasingly large proportion of its wealth must be devoted to investment abroad, and a less proportion to productive work at home. In this question there is a special necessity for a criticism of statistics, figures being so misleading unless they are carefully scrutinised.

Balanoglossus, a genus of worm-like animals in the class Enteropneusta or Hemichorda, showing interesting affinities with Vertebrates. The genus and others closely related to it are represented by numerous species, with a wide distribution in almost all seas. Most of them are littoral animals, burrowing in the sand and mud. Several species occur around British coasts. They vary from 1 inch to a foot or more in length, are often brightly coloured, and have a repellent odour



Young Balanoglossus; showing proboscis, collar, gill-slits, and gastric region (from Claus).

sometimes like that of iodoform. The body has four regions—a pre-oral 'proboscis,' a 'collar' around and behind the mouth, a respiratory region with numerous pairs of dorsal gill-clefts (hence the name Enteropneust, 'gut-breather'), and a posterior slightly coiled gastric region ending in the anus. The skin is ciliated and glandular, and the mucus it secretes tends to form sand-tubes. Although the proboscis and the collar become turgid in activity, the whole animal is very soft and breaks readily. There is great regenerative capacity. The permanently open mouth, on the ventral surface between the proboscis and the collar, has sand forced into it by the burrowing movements of the anterior portion of the body, and the food consists of the minute organisms and nutritive particles in the sand. The development is direct in a few species, indirect in most—i.e. with a larval form known as the Tornaria.

The affinities between Balanoglossus and Vertebrates are: (1) the gill-clefts; (2) the dorsal nerve-strand (but there is a ventral one as well); (3) a short somewhat 'notochord-like' rod which grows forward from the dorsal surface of the gut into the proboscis; and (4) the development of the Body-cavity (q.v.) from five pouches of the gut in a manner very suggestive of Amphioxus (q.v.). The last point seems also to indicate affinities with Echinoderms, to the larvæ of which the Tornaria larva of most species of Enteropneusts presents considerable resemblance. There are also indications of some distant relationship to Annelids, probably restricted to origin from a common stock. Nearly related to Balanoglossus are a number of genera—e.g. Dolichoglossus, Ptychodera, Schizocardium, and Spengelia. Perhaps allied are two peculiar types, Cephalodiscus (q.v.) and Rhabdopleura.

See S. F. Harmer, 'Hemichordata' in *Cambridge Natural History*, vol. vii. (1904); Spengel's great monograph in *Fauna und Flora des Golfes von Neapel* (1893); Bateson, *Quart. Journ. Micr. Sci.*, vol. xxv. (1885); Willey, *Zoological Results* (Cambridge, 1899).

Balanophoraceæ, a tropical family of dicotyledons, parasitic on tree-roots. A tuberous rhizome attached to the host-plant by suckers sends up (sometimes from within itself) a spike or head of small unisexual flowers and scaly leaves.

Ba'lanus. See ACORN-SHELLS.

Balasinor (VADASINOR), a tributary state of Guzerat, Bombay (area, 189 sq. m.; pop. in 1921 40,563); chief town, Balasinor, 51 miles N. of Baroda (pop. 8157).

Balasor', a seaport and chief town of a district of Orissa, on the Burhabalang River, 15 miles from its mouth; pop. (1921) 21,362.

Balata, the inspissated juice of a sapotaceous tree, *Mimusops Balata* (see BULLET-TREE), of tropical America, which is used as a substitute for rubber and gutta-percha, being intermediate in quality between the two, and very suitable for belting, &c. The latex contains about equal proportions of resin and of a gum almost identical with that of gutta-percha.

Ba'laton, LAKE (Ger. *Platten-See*), the largest lake in Hungary, 55 miles SW. of Budapest. Lying 426 feet above sea-level, it is 48 miles long, and 10 broad, with an area of 245 sq. m.; depth from 20 to 150 feet. It is fed by upwards of thirty streams—the chief of which is the Szala—as well as by numerous springs which rise on its margin. Its outlet is by the Sio, which discharges itself into the Sarvitz, a feeder of the Danube. Its clear and transparent, slightly brackish waters, assume a bluish colour in storms. Fish of various kinds are abundant, including the *fogash*, a kind of large perch (10 to 20 pounds), found only in this lake. A biological institute was opened at Tihany in 1927.

Balayan, a seaport of Luzón, in the Philippines, at the NW. end of the Gulf of Balayan.

Balbi, ADRIANO, geographer and statistician, was born in Venice in 1782, and in 1808 was appointed lecturer on Geography at Murano, in 1811 on Physics at Fermo. A subsequent residence in Portugal led him to publish at Paris in 1822 a work of great value on the statistics of Portugal. Balbi lived in Paris till 1832; he then returned to Italy and settled at Padua, where he died 14th March 1848. His *Atlas Ethnographique du Globe* (Par. 1826) is distinguished by its extensive accumulation of facts and views, giving an account of German researches on the subject, and entering into questions of comparative philology. His best known work is the *Abrégé de Géographie* (1832). His *Scritti Geografici* were edited by his son, Eugenio (5 vols. Turin, 1841–42).

Balbi, GASPARO, a Venetian merchant of the 16th century, who is worthy of mention as the first traveller who has left an account of India beyond the Ganges. In the pursuit of his calling, Balbi was often led to Aleppo, and from thence, on one occasion, he made a visit to India which lasted several years. A Latin translation of his *Viaggio* (1590), or account of his travels, was printed at Frankfort in 1594. In his journey he visited Baghdad, Basra, Goa, Cochin, and Pegu. He minutely records his own observations, but is excessively credulous in accepting information at second-hand.

Balbo, CESARE, COUNT, an Italian statesman and author, was born 21st November 1789 at Turin.

His father enjoyed the patronage of Napoleon; consequently the son served in various capacities under the empire, and afterwards as secretary of the Sardinian embassy at London. During the years 1821–43, he produced several works of a politico-historical nature. His *Speranze d'Italia* ('Hopes of Italy'), published in 1843, gave a vivid and intelligent picture of the political condition of Italy. It did not aim, however, at Italian unity, but rather suggested a confederacy of independent states, under the supremacy of the pope. Balbo's adherence to the Roman Catholic Church is strongly marked in all his works. He took a prominent part as a moderate Liberal in the political movements of 1847–48. He died 3d June 1853. See Lives by Ricotti (1856) and Reuchlin (1860).

Balboa, Vasco Núñez de, a Spanish conqueror, was born of a noble but reduced family at Jerez-de-los-Caballeros in 1475. After rather a dissolute youth, he gladly took part in the great mercantile expedition westward ho! of Rodrigo de Bastidas. He established himself in San Domingo, and began to cultivate the soil; but fortune proving adverse, in order to escape from his creditors, he had himself smuggled on board a ship, and joined the expedition to Darien in 1510, commanded by Francisco de Enciso. An insurrection which took place obtained for Balboa the supreme command in the new colony. Confused accounts which reached him of a great western ocean impelled him to set out in quest of it. On the 25th of September 1513 he obtained the first sight of the Pacific Ocean by a European from 'a peak in Darien.' The governorship of the territories conquered by Balboa was obtained in 1514 by Pedrarias Dávila, by means of his intrigues at the Spanish court. Balboa won over the Indians by his kindness, visited the Pearl Islands, and gave promise of further successes; but through Dávila's enmity he was accused of a design to rebel, and, in violation of all forms of justice, was beheaded at Acla in 1517. In Panamá (whose monetary unit, the gold *Balboa*, equals a U.S.A. gold dollar) the Quatercentenary of Balboa's discovery of the Pacific was celebrated, together with the opening of the Panamá Canal, by a National Exposition (1914).

Balbriggan, a watering-place in Dublin county, 21 miles N. by E. of Dublin, sacked in 1920 by men in uniform. It is a seat of salt, linen, and stocking manufactures. Its cotton stockings are remarkable for fineness of texture and beauty of open work. Many women are employed in embroidering muslin. Pop. (1926) 2278.

Bal'cony (till about 1825 Balco'ny; Ital. *balcone*), a projecting gallery in front of a window or of several windows, with a balustrade or parapet at its outer edge, and supported by consoles, or brackets fixed in the wall, or by pillars resting on the ground below. The balcony was unknown in Greek and Roman architecture, the earliest examples of it occurring in Italy, to the climate of which country it is peculiarly adapted.

Bal'dachin (Ital. *baldacchino*), a canopy of the form of a tent or umbrella, made of costly materials and richly adorned, which is either supported on pillars, or fastened to the roof over a throne or couch, or over a pulpit, an altar, or other sacred object. One of the most celebrated is the baldachin in the church of St Peter's in Rome, cast in bronze by Bernini, which is supported on four large twisted columns. From the days of Constantine, altars were often overshadowed by canopies called *ciboria*, from their resemblance to the bowl of a cup; and the sacrament was placed in a vessel suspended by a cord from the interior of this cupola. The proposal to erect a baldachin in St Barnabas Church, Pimlico, gave rise to litigation, which ended in a decision (15th December 1873) against the legality of such a structure in an Anglican church. Baldachin is also the name given to a kind of umbrella of a square form, supported on four poles, borne over the priest who carries the Host. The name, as well as the thing itself, comes from the East, where a baldachin was borne as a symbol of their rank over the heads of the great. Such canopies were often sent as presents from eastern princes to those in the West; as, for example, from the Khalif Haroun-al-Raschid to Charlemagne. During the Crusades, and the consequent trade with the East, they became well known to the Italians, and baldachin is merely a corruption of Baaldak, the name by which Baghdad was then known to Europe.

Balder, or Baldur, the hero of one of the most beautiful and interesting myths in the Edda, was, according to northern mythology, son of Odin and Frigga, and the husband of Nanna. Having dreamed evil dreams which threatened his life, he related them to the gods, whereupon they held a council, and endeavoured to secure his safety. Frigga took an oath from everything in nature, animate and inanimate alike, that it would not harm Balder, but she forgot the mistletoe. The gods, thinking Balder safe, in their mirth wrestled with him, and cast darts and stones at him. The malicious Loki alone took no part in the play, but changing himself into the form of an old woman, found out from Frigga that the reason for Balder's invulnerability was that everything but the little mistletoe had sworn not to harm him. Loki went in haste to fetch a bough, and repaired with it to the assembly of the gods, where he placed it in the hands of the blind Höder, the god of war, and directed his aim against Balder, who fell pierced to the heart. The sorrow of the gods was unutterable. Hermoder (the nimble) at once started on his journey to ask Hel, the goddess of Hades or the grave, to release Balder. She at once consented, on condition that all things should weep for Balder. All things wept, save the witch or giantess Thöck (the step-daughter of Loki), and so Balder must remain in the kingdom of Hel until the end of the world. At his funeral the pyre was placed on board his ship in presence of the frost-giants.

Balder is the best and wisest of the Æsir. His death is the great turning-point of the drama, as it proves the mortal nature of the gods. The powers of evil could not prevail as long as he lived, but his death is the doom of all the Æsir. Loki and his brood of wicked monsters are at first subdued, but at last they burst their bonds, and the great catastrophe of Ragnarök ensues. After long winter and war between the gods and the collected frost-giants, the forces of cold, fire, and darkness, in which both adversaries perish, comes the complete renovation of the world, in which the chief of the Æsir are hallowed and purified, and Balder returns from the under-world to inaugurate a reign of happiness and peace. It is probable that in the story of Balder there is an admixture of physical and moral allegory. Originally a nature-myth, it underwent a transformation through the addition of ethical conceptions, but the same early form continued to express the later religious ideas.

See Scandinavian Mythology and books there named; Grimm's *Deutsche Mythologie;* Frazer's *Golden Bough;* and Sydney Dobell's poem, *Balder the Beautiful.*

Baldmoney is a popular name for several kinds of Gentian (q.v.), also for an umbelliferous plant (*Meum athamanticum*) used as a carminative medicine.

Baldness (Gr. *alopecia*, 'fox-mange'). See HAIR. *Congenital baldness* (complete absence of hair at birth) is sometimes met with; but in most cases is only temporary, and gives place in a few years to a natural growth of hair. Occasionally, however, it persists through life.

Senile baldness (calvities) is one of the most familiar signs of old age. It commences in a small area at the crown, where the natural hair is first replaced by down before the skin becomes smooth and shining. From this area the process extends in all directions. It is more common in men than women. A precisely similar condition occurs not unfrequently at an earlier age (presenile baldness). It is generally due to hereditary tendency; but is favoured by keeping the head closely covered, especially with a tight-fitting cap or hat. The best authorities agree that this form of baldness is incurable.

There is a condition, however, which in its later stages much resembles the last, but is more amenable to treatment. Here the loss of hair begins simultaneously at the crown, and near the margin of the hair on the forehead. Its chief characteristic, however, is that it is preceded for some years by extreme scurfiness of the scalp. During this stage the process can be checked—sometimes, indeed, even after loss of hair has begun. The most successful treatment consists in thorough rubbing of the scalp with an ointment containing 10 per cent. of precipitated sulphur, or with Lassar's paste containing 10 grains of salicylic acid to an ounce of vaseline, at first nightly, then, as the scurf diminishes, at gradually longer intervals.

Great loss of hair frequently follows severe illnesses or other causes which produce general debility. As health returns, the hair usually returns with it; its growth may be promoted by the use of lotions containing cantharides, ammonia, or some other stimulating agent. Baths containing common salt, and brisk rubbing, are also useful.

Baldness in patches (*alopecia areata*) attacks chiefly children and young persons, frequently those of debilitated constitutions. The only change at first perceptible is that the hair falls out in one or more places, leaving smooth bare patches. These may gradually extend, and with the progress of the disease the affected skin becomes somewhat thinned. It is liable to be mistaken for Ringworm (q.v.). *Alopecia areata* has been attributed to the action of a parasite; but it is more probably due to some obscure nervous influence. Mild cases almost always recover; and even in the worst forms complete restoration of the hair may take place, sometimes after many years of baldness. The treatment consists in stimulation of the skin, blistering, salt baths, the use of electricity, &c. In all forms, attention must be paid to the general as well as the local treatment. A liberal diet and the use of iron and other tonics are frequently of the greatest service.

Baldric is a belt or sash worn partly as a military and partly as a heraldic symbol. It goes round the waist as a girdle, or passes over the left shoulder, and is brought down obliquely under the right arm, or is suspended from the right shoulder in such a way as to sustain a sword. Many of the effigies of knights show the baldric, more frequently as a belt than a shoulder-sash.

Baldung, HANS, called also Hans Grün, a German painter and wood-engraver, contemporary with Dürer, to whom, in expression, colouring, and finish, he was little inferior. He was born at Gmünd, in Swabia, about 1488, and died at Strasburg in 1545. His masterpiece, a painting of the Crucifixion, is in Freiburg Cathedral. He also worked in stained glass. See book by Schmitz (1922).

Baldwin I., king of Jerusalem, 1100–18, was born in 1058. He was the youngest brother of Godfrey (q. v.) of Bouillon, with whom he took part in the first Crusade; but having quarrelled with Tancred, he retired to Edessa, of which he was soon after elected prince. After the death of his brother Godfrey, in 1100, he became Protector of the Holy Sepulchre, and Baron of Jerusalem, and immediately assumed the regal title, which his brother had refused. He conquered Cæsarea, Ashdod, and Tripolis, and, with the assistance of a Genoese fleet, made himself master also of Acre, and subsequently of Sidon, but failed to reduce Ascalon. He died in 1118.—BALDWIN II., cousin and successor of Baldwin I., reigned from 1118–31. During his reign Tyre was taken, and the order of the Templars was instituted. He died in 1131, having resigned the crown in favour of his son-in-law, Foulques of Anjou, who reigned till 1134. —BALDWIN III., king of Jerusalem, 1143–62, the son and successor of Foulques of Anjou, was born in 1129. He was regarded as a model of knighthood, and his authority and influence were great. He died in 1162, and with his death the Christian power in the East began to decline. He was succeeded in the government by his brother Amalric, who died in 1173.—BALDWIN IV., the son and successor of Amalric, surnamed the Leper, reigned till 1184, when he caused BALDWIN V., a child of six years old, the son of his sister Sybilla, to be crowned. The child died in 1186.

Baldwin I., the first Latin emperor of Constantinople, was born at Valenciennes in 1171 A.D., and succeeded his parents as Count of Hainault and Flanders in 1195. In 1200 he joined the fourth Crusade, and assisted in the recapture of Constantinople for the Emperor Isaac II. As the latter failed in his payments, the Crusaders turned their arms against him, and sacked the town. Alexis having been murdered in a rising of the citizens, Baldwin was chosen emperor, and crowned in 1204. The Greeks, invoking the aid of the Bulgarians, rose and took Adrianople. Baldwin laid siege to the town; but, defeated and taken prisoner by the Bulgarian king, he died about a year after (1206) in captivity.

Baldwin II. (1217–73), nephew of Baldwin I., succeeded to the throne as a boy in 1228, but was never able to hold his own with Greeks and Bulgarians. His capital was taken in 1261 by the Greeks. He fled to Italy, and with him fell the Latin empire of Constantinople. See BYZANTINE EMPIRE.

Baldwin, ROBERT (1804–58), born in Toronto, was called to the bar, held office under Sir Edward Head, in 1840 became Solicitor-general for Upper Canada, in 1842–43 was Premier, and in 1848–51 was Attorney-general for Upper Canada. As founder of the 'Reform' party, he is reckoned one of the 'makers of Canada.' See book by Ross (1906).

Baldwin, STANLEY, born in 1867, and educated at Harrow and Trinity College, Cambridge, turned in 1908 from a successful career in business to parliament. In 1917 he was appointed Financial Secretary to the Treasury. In 1922 he had a main hand in breaking the Coalition, and became Chancellor of the Exchequer. On Mr Law's resignation in 1923 he became Prime Minister. In December he appealed to the country for a mandate to introduce Protection, but was defeated. He acted as chief of the opposition and leader of the Unionist Party during the Labour administration. His second term of office (from 1924) was disturbed by the coal dispute of 1926 and other perplexities.

Bâle. See BASEL.

Bale, JOHN, Bishop of Ossory, was born at Cove, near Dunwich, in 1495. From a Carmelite monastery at Norwich he passed to Jesus College,

Cambridge, and obtained a living, though already a Protestant. In 1540 he had to flee to Germany, whence, in 1547, he was recalled by Edward VI., who five years later made him Bishop of Ossory in Leinster. Here 'Bilious Bale' made himself so obnoxious to the Catholics that, on news of the death of Edward, his house was attacked and his effects destroyed, and he himself escaped to Holland with great difficulty. On the accession of Elizabeth he was made a prebendary of Canterbury. He died in 1563. His fame rests partly on a Latin history of English literature (1548), which is a valuable work, though sections of a book are often set down in it as distinct works, and persons who never wrote anything are given as authors. He occupies an important place in the history of the drama. His plays are sorry doggerel; yet his *Kinge Johan* (Camden Society, 1838) is a link between such moralities as his own *Brefe Comedy of Johan Baptyste* and the masterpieces of the Elizabethan stage. The Parker Society published his select works (1849).

Balearic Isles, a group—Majorca (q.v.), Minorca (q.v.), Iviza (q.v.), with Formentera, Cabrera, and several smaller islets—lying off the coast of Valencia. They form a province of Spain (q.v.), having been successively Carthaginian, Roman, independent (1220–1344), and a dependency of Aragon (from 1349). The *Baleares* were famous slingers; and their name was derived by the ancients from the Greek *ballein*, 'to throw.'

Baleen, a name for whalebone. See WHALE.

Bale-fire. See BEACON.

Balfe, MICHAEL WILLIAM, composer, was born in Dublin, 15th May 1808. His musical talent received early culture, and in his ninth year he made his début as a violinist, having begun to compose at least two years earlier. In 1823 he came to London, and during 1825–26 studied in Italy under Paer, Galli, Federici, and Rossini. In 1826 he wrote the music for a ballet, *La Pérouse*, performed at Milan; and in 1827 he sang in the Italian Opera at Paris with great applause, his voice being a pure rich baritone. In 1833 he returned to England, and in 1846 was appointed conductor of the London Italian Opera. He died at Rowley Abbey, his estate in Hertfordshire, 20th October 1870. Of his numerous operas, operettas, and other compositions, produced in rapid succession from 1830, the most permanently successful have been *The Bohemian Girl* (1843), *The Rose of Castile* (1857), and *Il Talismano* (1874). If Balfe was wanting in depth and dramatic force, he had a very thorough knowledge of effect and command of orchestral resources; his compositions show much fluency and melodic power; and many of his songs are admirable. See works on him by Kenney (1875) and Barrett (1882).

Balfour, ARTHUR JAMES, EARL OF BALFOUR (1922), K.G., was at the beginning of the 20th century by far the foremost of British Conservative leaders, distinguished for sagacity, caution, and debating power, a philosophical thinker of eminence, and a man of exceptional culture in music and otherwise. Born 25th July 1848, in 1856 he succeeded his father in the estate of Whittinghame, Haddingtonshire. Educated at Eton and Trinity College, Cambridge, he entered parliament in 1874 as Conservative member for Hertford, and from 1878 to 1880 was private secretary to his uncle, Lord Salisbury, whom he accompanied to the Berlin Congress. For a while an unattached member of Lord Randolph Churchill's 'Fourth Party,' he led off the attack on the 'Kilmainham Treaty' (1882), negotiated with Lord Hartington the franchise compromise (1884), was returned for East Manchester (1885), and was appointed president of the local government board (1885), secretary for Scotland (1886), and chief-secretary for Ireland (1887). In this perilous post, the grave of so many reputations, the 'dilettante philosopher' soon surprised the country, but especially the Irish members, by the energy with which he set himself to administer the laws and enforce discipline without fear and without favour, and apparently wholly undisturbed by invective or calumny: before the five years he held the office were out, 'bloody Balfour' was even more respected than he was hated or feared. He became First Lord of the Treasury and leader of the House of Commons in 1892, 1895, and 1900; as prime-minister in 1902–5 he accepted—not very heartily, as was thought—a policy of tariff reform (see CHAMBERLAIN), including retaliatory tariffs. The Education Bill of 1902 was bitterly opposed by the Nonconformists, and a licensing bill failed to conciliate reformers. As leader in opposition of the Unionist party from 1906, he displayed even more brilliantly than in office many of the higher gifts of a great parliamentarian, was the 'Rupert of debate' in his time, and during the struggles on the Lloyd George Budget and the Parliament Bill succeeded in maintaining the cohesion of both wings of the party—not without dissidence on the part of the 'forwards,' who demanded a more active and aggressive policy. Feeling the increasing strain on his physical powers, he resigned the leadership of the party before the introduction of the threatened Home Rule Bill and the manhood suffrage bill. His temperament, somewhat critical, speculative, and sceptical, led him to disdain some of the minor arts of the politician. In the Coalition ministries he was First Lord, Foreign Secretary, and Lord President of the Council. He attended the Peace Conference and the Washington Conference (1921–22). He again became Lord President in 1925. He wrote *A Defence of Philosophic Doubt* (1879), *Essays and Addresses* (1893), *The Foundations of Belief* (1895), *Theism and Humanism* (1915), *Essays Speculative and Political* (1920), *Theism and Thought* (1923).—His brother, FRANCIS MAITLAND BALFOUR, embryologist, was born at Edinburgh in 1851, and educated at Harrow and Trinity College, Cambridge. His researches on the development of the elasmobranch fishes threw new light on many problems of vertebrate morphology, and he took a leading part in the work of founding the Cambridge school of natural science. In 1878–83 appeared his well-known *Comparative Embryology*. Besides receiving many scientific distinctions, and declining tempting offers from Oxford and Edinburgh, he was appointed to a special chair of Animal Morphology in 1882. But on the 19th July of that year he lost his life while attempting to climb one of the spurs of Mont Blanc.—Another brother, GERALD, born 1853, from Eton passed to Trinity College, Cambridge. Conservative M.P. for Central Leeds (1885–1906), in 1895 he became Chief-secretary for Ireland, and in 1900–5 was President of the Board of Trade, and in 1905–6 of the Local Government Board.—For their sister, see SIDGWICK (HENRY).

Balfour, SIR JAMES, Lord President of the Court of Session, was a son of Sir Michael Balfour of Montquhanie, Fife. In early life he was implicated in the plot against Cardinal Beaton, and on the surrender of the castle of St Andrews (1547) he was carried prisoner to France with John Knox. Two years later he purchased freedom by apostasy, and returning to Scotland, entered on that infamous career in which he 'served with all parties, deserted all, and yet profited by all.' When Morton was made regent, Balfour received a commission to make a general digest of the law. It is doubtful, however, how far the *Practicks of Scots Law* that bears his name is really his; for, not feeling him-

self safe in Scotland, he left it for France, where he remained seven years (1573–80). He died in 1583.

Balfour, JOHN, of Kinloch, or of Burley in Scott's *Old Mortality,* was one of the chief actors in the assassination of Archbishop Sharp in 1679, for which his estate was forfeited, and a price set on his head. He fought at Drumclog and Bothwell Bridge, and is said afterwards to have escaped to Holland. By one account he died on a homeward voyage to Scotland; by another he never left the country, but settled in the parish of Rosneath, Dumbartonshire. Balfour of Kinloch is not to be confused with Lord Balfour of Burleigh. Contemporary with him were the second Lord Balfour of Burleigh, who was a privy councillor in 1641, and the third lord, who succeeded in 1663 (see below).

Balfour, JOHN HUTTON (1808–84), born in Edinburgh, studied medicine at the university there, and after being for four years professor of Botany at Glasgow, held the botany chair at Edinburgh University from 1845. He wrote manuals and class-books of botany.

Balfour of Burleigh (ALEXANDER HUGH BRUCE), the sixth lord, was born 13th January 1849, from Eton passed to Oriel College, Oxford, and in 1869 had the peerage restored to him, which had been in abeyance since the '15. In 1889–92 he was parliamentary secretary to the Board of Trade, and in 1895–1903 he was Secretary for Scotland, retiring as a Free Trader. Chairman of many important commissions, including those on food-supply in time of war, and on closer relations between Canada and the West Indies, he was a strenuous opponent of the disestablishment of the Church of Scotland. He died 6th July 1921.

Balfrush' (or more correctly BARFRUSH, 'mart of burdens'), a town in the Persian province of Mazanderan, on the river Bhawal, 14 miles from its mouth in the Caspian Sea. The river is not navigated, all goods being landed at the port of Meshed-i-Ser, on the Caspian. Balfrush is a centre of trade between Russia and Persia, exporting large quantities of silk, rice, and cotton, while the Russians supply iron and naphtha. It has several Mohammedan colleges. Pop. 50,000.

Ba'li, or LITTLE JAVA, one of the Sunda Islands, lying east of Java, about 75 miles long by 50 broad. Its area is 2300 sq. m.; pop. 960,000. A chain of mountains crosses the island from east to west, rising in the volcanic peak of Gunung-agung to 12,379 feet. Agriculture is the chief employment of the people. They grow rice, indigo, cotton, fruits, maize, and edible roots, and possess buffaloes and cattle. Fish are plentiful. Coffee is now exported in considerable quantity from Buleleng, the trading capital. The Balinese are a superior race, and speak a language related to Javanese. They excel as sculptors, and in working gold, silver, and iron. Their religion is Brahmanism of an ancient type, and they still keep up some rites which have disappeared from India. Under the Dutch, the nine little principalities of the island are governed by native rulers. Chinese and a few Europeans are the chief traders. For ritual see *Folklore,* xxxiv. 3 (1923).

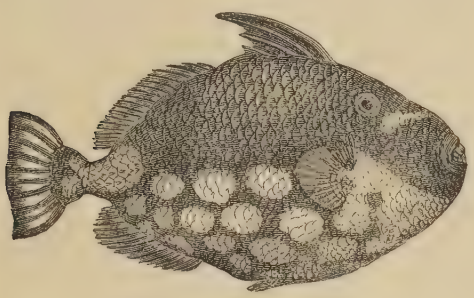
Balik Papan, a port of south-east Borneo, the centre of the petroleum industry.

Baliol, or BALLIOL, an Anglo-Norman family that played a part in Scottish history. Its founder, Guido or Guy, held Bailleul, Harcourt, and other fiefs in Normandy, and from Rufus, whose father he had followed to England, received broad possessions in Durham and Northumberland. Bernard, his son, built the fortress of Barnard Castle; *his* great-grandson, John, founded Balliol College, Oxford (by way of penance), died in 1269, and was survived till 1290 by his widow, Devorguila, the daughter and co-heiress of Alan, Lord of Galloway, and the great-great-granddaughter of David I.—Their son, JOHN DE BALIOL, born in 1249, succeeded in her right to the lordship of Galloway, as well as to his father's vast possessions in England and Normandy. On the death of the Maid of Norway in 1290, he became a competitor for the crown of Scotland, and his claim was pronounced superior to that of the other principal competitor, Robert Bruce, Lord of Annandale. The arbiter was Edward I. of England, who found this a fit opportunity for asserting his claim as lord-paramount of Scotland. That claim was acknowledged by the Scottish Estates in submitting the contest to his decision; and, consistently with this ignominious submission, Baliol, before and after his coronation at Scone (1292), swore fealty to Edward as his feudal superior. He was soon made to feel that his sovereignty was merely nominal, and, abject as he had shown himself, the indignities which he experienced at length roused him to an assertion of his rights as king. In 1295 he took upon him, by the advice of his nobles, to conclude an alliance with France, then at war with England. This act of revolt was followed by speedy chastisement. Edward invaded Scotland with a large force; defeated the Scottish troops; took Baliol prisoner, and compelled him formally to surrender his crown, July 7, 1296. Baliol was confined for three years at Hertford and in the Tower, enjoying, however, a limited freedom and something of royal state. In 1302 he was permitted to retire to his estates in Normandy, where he died in 1315, the year after Bannockburn. The estimate by his subjects of this poor-spirited prince was significantly indicated by the nickname of 'Toom Tabard,' or Empty Jacket.—EDWARD, his son, in 1332 made himself momentarily conspicuous in history by his daring and successful invasion of Scotland. Accompanied by the 'disinherited barons,' who were bent on recovering their forfeited Scottish estates, he landed with 3400 followers at Kinghorn in Fife; defeated the Earl of Fife; pushed boldly into the country; and at Dupplin Moor in Perthshire, on the night of 12th August, surprised and routed 30,000 men under the new regent Mar, who himself was slain, with 13,000 besides. On 24th September, seven weeks from the date of his landing, he was crowned king of Scotland at Scone. He had not enjoyed the kingly dignity for full three months, when he was surprised in his camp at Annan by Archibald Douglas, and nearly lost his life as well as the crown he had so recently assumed. His subsequent career is the very reverse of what might have been anticipated from so adventurous a beginning, being marked only by weakness, servility, and misfortune. He died near Doncaster in 1367, and with him ended the house of Baliol.

Balista. See BALLISTA.

Balis'tés, or FILE-FISH, a genus of bony fishes of the order Plectognathi of Cuvier; the type of a large family, Balistidæ, the species of which are almost all inhabitants of tropical and subtropical seas, frequenting rocky coasts and coral-reefs. One species has been occasionally found on British coasts. Their colours are generally brilliant. The skeleton, as in the other Plectognathi, is in part gristly or cartilaginous, and the external covering of the body often resembles that of the Ganoid (q.v.) fishes, consisting, in some of the genera, of bony plates, disposed in regular rows, and not overlapping; in others, of very small rough scales, with stiff bristles, as densely crowded as the pile of velvet. The snout protrudes slightly, and the teeth are few, but well developed. But the most interesting thing in connection with these

fishes, is the provision for fixing the first dorsal spine in an erect position, or lowering it at the will of the animal. The spine is articulated by ring and bolt to a broad bony plate in connection with the backbone. 'When the spine is raised, a depression at the back part of its base receives a corresponding projection from the contiguous base of the second ray, which fixes it like the hammer of a gun-lock at full cock, and



Balistes conspicillum.

it cannot be let down until the small spine has been depressed, as by pulling the trigger; it is then received into a groove on the supporting plate, and offers no impediment to the progress of the fish through the water. This trigger-like fixing of the spine takes place also in the dead fish; and when a Balistes is removed from the bottle for examination, it is generally necessary to release the spine by pressing on the small trigger-ray.' The fish is called at Rome *pesce balestra*, in reference to the resemblance between the principle of the above mechanism and that of the Roman dart-throwing engine, *ballista*. The first spine is roughened with enamel projections, whence the name File-fish. The flesh is unwholesome.

Balize. See BELIZE.

Balkan Peninsula is a usual name for the peninsula in South-eastern Europe running southwards between the Adriatic and the Ægean. The most convenient northern boundary is the Save and the Lower Danube; though historically and politically Rumania and the more northerly parts of Yugoslavia are closely associated with the regions south of that boundary. Greece is a peninsula upon a peninsula, and has not always been accounted one of the Balkan States. In a general way the Balkan Peninsula and Balkan States cover the area of Turkey in Europe and the non-Turkish states which were in modern times under Turkish suzerainty, with the exception of Rumania. By its physical relief and general slope, the peninsula may be said to turn its back upon Europe. Its greatest elevations are found in the west and north-west, and its waters, flowing north, east, and south, finally empty into the Black Sea or into the Ægean. The mountain chains and masses of the peninsula in no place form a regular system; they are notable for their great variety of shape and richness of contour. The Balkans proper (ancient *Hæmus*) formed the boundary between Bulgaria and Eastern Roumelia. They are highest in the west, where the mean height is 6500 feet. The ridge is crossed by some 30 passes, of which the Shipka, between Kazanlik and Trnovo, 4290 feet high, is the most noted in history—especially as the scene of severe fighting in the Russo-Turkish war of 1877–78. The mountain-chains in the west of the peninsula have a trend parallel to the shores of the Adriatic and Ionian seas, whilst in the east, the chief ranges diverge from a nucleus near Sofia. The small though well-defined chain of the Rhodope (Despoto-Dagh) has a mean elevation of 5500 feet, and forms the water-parting between the Maritza Valley on the north and the other Ægean rivers on the south. Muss-alla (9533 feet), at the north end of this range, is the culminating point of the northern portion, but the highest peak of the peninsula is Mount Olympus (9793 feet), north-east of the plain of Thessaly. There are several other ranges—the Dinaric Alps in the north-west, Pindus, between Albania and Thessaly; and peaks 5000 to 9000 feet high occur in nearly every part of the peninsula.

The first place in the hydrographic systems of the peninsula must of course be given to the Danube. The Sea of Marmora receives only a few mountain-torrents, but the drainage area of the Ægean is the most important Balkan system. The chief rivers —the Maritza (Hebros), the Mesta (Nestos, Kara Su), the Struma (Strymon, Kara Su), the Vardar—flow from the southern slopes of the Balkans and the crystalline masses of the Rhodope system. Lake Scutari, Lake Ochrida, and Lake Presba (the last 2800 feet above sea-level) are those of greatest size in the peninsula.

Ethnography.—The great highway of western emigration, the Balkan Peninsula still retains a great diversity of peoples. The oldest inhabitants of the peninsula—the Illyrians—have their representatives in the modern Albanians (Skipetar); the Greeks are there, and have kept their language; the Dacians, who adopted the Roman tongue, are the Rumans or Rumanians of to-day. The Slavonic peoples are, of course, a large and important section of the population. Of the Turanian settlers, the Bulgars have become a thoroughly Slavonised people; and the Ottoman Turks, who first gained a footing in 1355, conquered nearly the whole of the peninsula before the close of the century, reduced Greece to subjection between 1455 and 1473, and remained masters to the 19th century.

According to Reclus, the peninsula and its islands may be divided into four ethnological zones: (1) Crete and the islands of the Archipelago, the seaboard of the Ægean, the eastern slope of Pindus and of Olympus, are peopled by Greeks; (2) the space comprised between the Adriatic and Pindus is the country of the Albanians (Skipetar); (3) on the NW. the region of the Illyrian Alps is occupied by Southern Slavs, known under the names of Serbs, Croats, Bosnians, Herzegovinians, and Chernagorans (Montenegrins); and (4) the two slopes of the Balkans proper, the Despoto-Dagh, and the plains belong to the Bulgarians. The Turks were scattered here and there in more or less considerable groups, chiefly round the cities and strongholds; but the only extensive tract of country of which they were and are, ethnologically speaking, the possessors is the eastern angle of the peninsula. As to the relative numbers of these varied elements, there is considerable diversity of statement—each stock trying to prove its ethnical predominance in debatable ground. The exchange of populations agreed to between Turkey and Greece in 1923, though it did not apply to Greeks in Constantinople or Turks in West Thrace, considerably lessened the confusion. But the ethnological map set beside the political reminds us that Albania was a newcomer among the nations and that Bulgaria was on the losing side. The Kutzovlachs are too remote and scattered to hope for union with Rumania. And Macedonia is still a chequerboard.

The home of so many diverse peoples, the peninsula has long been a hotbed of warring interests, intertribal jealousy and intrigue, political tyranny and disturbance, and mutual maltreatment. The Turk's hand may summarily be said to have been against every man's hand, and every other against the Turk.

Greeks and Bulgarians intrigued each against the other with Russia and elsewhere, and look on the inheritance of the peninsula as exclusively theirs by right. Bulgarian and Serb, though cherishing the Slavonic name, met in the bloody campaigns of 1885–86, 1913, 1915–18. Macedonia in especial is demanded alike by Greek, Bulgar, and Serb. And the case is further complicated by the hostile faiths—Latin Christianity, Greek Church both Orthodox and United, and Mohammedanism. Hence it is easy to infer the last degree of unstable equilibrium in the political sphere, and to understand why the peninsula is a perpetual focus of the insoluble 'Eastern Question,' and a cause of disquietude to all the powers of Europe. Russia has warred with Turkey; Austria and Russia have had diametrically opposed interests as regards the Lower Danube, and in the Dual Monarchy Hungarian and Slav took opposite sides as to the Southern Slavs; France, Britain, and Germany have by no means always been able to see eye to eye at the Porte; Italy has her own special interests beyond the Adriatic; and the Turkish constitution of 1909 did not succeed in conciliating the Albanians, or allaying the secular rivalry between Greeks and Bulgarians in Macedonia.

Greece obtained her independence in 1836, as also did Serbia in 1830–67. Wallachia and Moldavia (from 1859 as Rumania) were made tributary principalities 1856. Rumania and Serbia obtained their complete independence by the Berlin Treaty of 1878, which also handed over to Austria-Hungary the administration of Bosnia and Herzegovina, and established the principalities of Montenegro and Bulgaria, and the self-governing province of Eastern Roumelia. Rumania became a kingdom in 1881, Serbia in 1882, Montenegro in 1910. In 1885 Roumelia declared for union with Bulgaria, which in 1908, at the time of the revolution in Turkey, declared its independence and took rank as a kingdom. In 1908 also Austria formally annexed Bosnia and Herzegovina, assigning them a constitution. Momentarily suspending their mutual animosities, the Greeks, Southern Slavs, and Bulgars made war upon Turkey in 1912, and might have driven her out of Europe had not each aimed at gaining more than their share of the spoils. The net result of the war and the second war (1913) that grew out of it was that Albania was made independent; Greece, Serbia, and Montenegro doubled; Bulgaria considerably increased at Turkey's expense, and Rumania at Bulgaria's. After the great European war, Serbia, Montenegro, and the Southern Slav regions of the dual monarchy were united as Yugoslavia, Bulgaria curtailed, Turkey all but eliminated, and Greece greatly extended. The campaigns of 1921 and 1922 gained back for the Turks part of what they had lost.

See TURKEY, GREECE, BULGARIA, SERBIA, &c., and books there cited; EASTERN QUESTION; SLAVS; books on the Balkan countries by Laveleye (1887), Miller (1896 and 1899), Wyon (1904), Fraser (1906), Herbert (1906), Booth (1906), Villari (1906), Miss Durham (1906), Crawford (1915), and Seton-Watson (1917); and Brailsford's *Macedonia* (1906).

Balkh, a district of Afghan Turkestan, corresponds to ancient Bactria. It is bounded on the N. by the river Oxus, on the E. by Badakhshan, on the S. by the Hindu-Kush, and on the W. by the desert. Offsets of the Hindu-Kush traverse it in a NW. direction, and slope down to the low steppes of Bokhara. Its situation was once important during the overland commerce between India and Eastern Europe before the sea-route by the Cape of Good Hope was followed. The soil has the general characteristics of a desert land; only a few parts are made fertile by artificial irrigation; and such are the vicissitudes of climate, that where grapes and apricots ripen in summer, and the mulberry-tree permits the cultivation of silk, in winter the frost is intense, and the snow lies deep on the ground. The natives are Uzbegs (q.v.), whose character differs in different districts.

BALKH, long the chief town, situated in a district intersected by canals and ditches, by means of which the waters of the Balkh-ab, or Dehâs, are dissipated and prevented from flowing towards the Amu-Daria, only 45 miles distant. It is surrounded by a mud wall; but though bearing the imposing title of 'mother of cities,' it has not in recent times had any of the grandeur of ancient Bactra (see BACTRIA), near the site of which it is built. It was twice destroyed by Genghis Khan and Timur. A terrible outbreak of cholera in 1877 caused the capital of Afghan Turkestan to be transferred to Mazar-i-Sharif, south-east of Balkh; since which Balkh has fallen into decay. West of Balkh are the petty Uzbeg khanates of Maimana, Andkhui, Akcha, and Shibarghan; east of Balkh are the towns and khanates of Kunduz and Khulm (Tashkurghan). These Uzbeg khanates, inhabited by Tajiks, Uzbegs, Persians, and Turkomans, are in the basin of the Amu-Daria, and with the exception of Maimana, which forms a small province, constitute the province of Afghan Turkestan (see map of AFGHANISTAN). In a wider sense the term includes the neighbouring provinces Badakhshan and Maimana.

Balkhash' (Kirghiz *Tengis;* Chinese *Sihai*), a great inland lake in the east of the Cossack Republic, between 44° and 47° N. lat., and 73° and 79° E. long. Lying 780 feet above sea-level, it extends 323 miles WSW.; its breadth at the west end is 50 miles, at the east from 9 to 4 miles; the area is 8400 sq. m. The water is clear, but intensely salt. Its principal feeder is the river Ili. It has no outlet. The northern edge is well defined; but the southern shores of the lake are labyrinths of islands, peninsulas, low sandhills, and strips of shallow water, with enormously tall reeds, in which wild swine shelter. The lake once extended over the arid plain to the south (see ASIA); and from 1890 to 1910 its waters were rising.

Ball, JOHN, a priest who was one of the leaders in the rebellion of Wat Tyler (q.v.), and was in several respects a precursor of Wycliffe (q.v.), having been repeatedly in trouble for heresy from 1366. He was hanged, drawn, and quartered in 1381. See RICHARD II.

Ball. SIR ROBERT STAWELL, LL.D., F.R.S. (1840–1913), from 1892 Lowndean professor of Astronomy at Cambridge, was born in Dublin, and studied at Trinity College. He was appointed Lord Rosse's astronomer at Parsonstown in 1865; professor of Applied Mathematics and Mechanics at the Royal Irish College of Science in 1873; and in 1874 professor of Astronomy at Dublin, and astronomer royal for Ireland. He published works on mechanics and astronomy, of which the best known is *The Story of the Heavens,* besides many magazine articles, and was well known as a lecturer. See his *Reminiscences and Letters* (1915).

Ball. Games with balls were among the most favourite gymnastic exercises of the ancients. They were played almost daily by all, young and old alike; by the highest statesman equally with the lowest of the people. The Greeks prized the game as a means of giving grace and elasticity to the figure; and in their gymnasia, as in the Roman baths, there was a special compartment for ball-playing, where certain rules and gradations of the exercise were to be observed according to the state of health of the player. The balls were of very various kinds; they were

generally of leather, and filled with air; others were stuffed with feathers. Ornamented balls, composed of twelve differently coloured segments (such probably as are to be seen in modern toy-shops), are mentioned in Plato's *Phædo*. There was great variety in the kinds of game, each having a name. In one, the ball was thrown up, and the players strove who would catch it as it fell; another was the same as our football; in a third, a number of persons threw it at one another, either with a view to hit, or for the ball to be caught and returned; in a fourth, the ball was kept rebounding between the earth and the palm of the player's hand as often as possible. Ball-playing seems to have been of equal antiquity in the west of Europe, and to have come down uninterruptedly to modern times. In the 16th century it was in great favour in the courts of princes, especially in Italy and France. Towards the end of the 18th century it went out of fashion in the higher circles of continental society, though it is still practised by the people in Italy and Spain, nowhere with more enthusiasm than among the Basques at the base of the Pyrenees. Forms of it, more or less practised, and all of them separately noticed, are Base-ball, Cricket, Croquet, Fives, Football, Golf, Lacrosse, Tennis, Polo, &c.

Ball. See BULLET, CARTRIDGE, SHOT.

Ballabgarh, a town of India, the capital of a native state of the same name, in the Punjab, which was annexed at the Mutiny and made a tahsil of Delhi district. It contains a palace and several temples, and has a trade in food-grains. Pop. 4000.

Ballachulish, a village of Argyllshire, on the south shore of salt-water Loch Leven, 16½ miles S. of Fort-William. Its celebrated quarries, opened about 1760, still yield excellent blue roofing-slate, but are less actively worked than formerly. Glencoe (q.v.) is close by; and 8 miles ENE. is Kinlochleven. See LEVEN (LOCH). Pop. of the village, about 1000.

Ballad. The word ballad is derived through the medium of French from the late Latin *ballare*, 'to dance,' and thus meant originally a song sung to the rhythmic movement of a dancing chorus—a dramatic poem sung or acted in the dance, of which a kind of survival is seen in the ring-songs of children's games at the present day. Now the name is sometimes applied to a simple song, usually of a romantic or sentimental nature, in two or more verses, each sung to the same melody—a form the permanent popularity of which is proved by the crowded audiences at modern 'Ballad Concerts' in London and elsewhere. Such a ballad, as distinguished from a song, has something of the narrative or dramatic; and, however difficult it may be to bring to an exact definition examples on the border-line between the two, this distinction is not obsolete even in the musical world, in spite of modern looseness of phrase. But in literature the name ballad means more particularly a simple, spirited, narrative poem in short stanzas of two or four lines (without counting the burden or refrain), in which a story is told in straightforward verse, often with great elaborateness and detail in incident, but always with graphic simplicity and force. The expression is marked by an artless naïveté and unconsciousness of art—it aims to be merely the perfect and living impress of the reality which it represents. Of all narrative and lyrical forms it is the simplest and most direct in its effect, in its power of representing to the imagination with vividness and truth incidents or natural emotions which it attempts to portray. It deals with the elemental human emotions, and its success as a literary form depends upon the potency with which these are sympathetically revived within the imagination of the hearer or the reader. It is obvious that such a form of literary expression is best fitted to a simple and unlettered age, and it is equally obvious that in an age of greater refinement and complexity in the conditions of social and intellectual life, it is difficult, if not impossible, for an artist so to divest himself of the effects of his environment as to reproduce it without affectation and unreality. And this is exactly what we find when we turn to contrast our traditional ballad poetry with the productions of the modern imitative school. Fine poetry though much of its work may be, we feel instinctively that it lacks the spontaneity and genuineness of the antique, the true simplicity born of the absence of self-consciousness—out of the singer's capacity for forgetting himself in his song. We can no more recover the naïveté of the early singers than the grown man can recover the simplicity of the child. But from singers who are wise enough to follow the analogy of nature in her continual advancement to new varieties from antecedent types, we may look for work which, while preserving the traditions of preceding times, will yet represent genuinely the spirit of its own, and save to us all the gains of culture and refinement which the generations have brought us, with something of the earnestness and reality of former days. Coleridge's *Rime of the Ancient Mariner*, Tennyson's *Revenge*, Browning's *Hervé Riel*, and Rossetti's *King's Tragedy*, preserve the best traditions of the ballad, while they are as genuine nineteenth-century poems as *In Memoriam* or the *Ode to a Nightingale*.

Our traditional ballads, then, stand by themselves, and bear upon their face the best evidence of their age. Their makers were not authors by profession, and it is natural that their names should be forgotten. Of course, ballads may have been written by men of any class, especially at a time when all audiences were unlettered and alike in taste, and the possession of literary culture was not the separating line that it is at present. For example, the Spanish romances, which are indeed not a little exceptional, and to be distinguished from the ballads resembling ours still traditional in Spain, are clearly the work of men above the vulgar. Nowhere perhaps has there been a richer growth of really popular ballads than in Sicily, where Pitré tells us as many as seven thousand examples have already been gathered. Here the bulk of the population still stands at that ballad stage which in the evolution of our national culture we Englishmen have already left several generations behind us. Our ballads were made by the people for the people, and they went straight to the hearts of their hearers, who, if they lacked the refinement of their successors, were not less quick to feel the hot human emotions—love, hate, pity, and fear. They were versified originally by unlettered men for unlettered audiences; and passing as they did from mouth to mouth and generation to generation of reciters possessing the literary sense in very varying degrees, it is not wonderful that many changes of omission or alteration have slipped in, and that what are really the same ballads are found in versions differing considerably from each other. Personal tastes and prejudices would interfere, while accidentally discovered felicities of thought or phrase would often occur, and be added to the recited poems by individual reciters, so that it might be wondered at that the differences of versions are not much greater than they are. The ballads must have gained in strength in the course of transmission, as the happy changes would stand and live in the memory, while the feebler words and verses would fall aside and disappear. Molière's old housekeeper had as true a sense for felicity

of expression as the ladies of the court; so the instincts of the people guided the reciters to the choice of the best word, and when it was found, their memories retained it. But unfortunately the process of transmission has not always been synonymous with a process of refinement or improvement, but has often weakened and spoiled as well as strengthened and amended. Especially is this true with the ballads of the southern English folk, which too frequently are flat, spiritless, and didactic, totally unlike the Scottish and north-country English ballads. The reader cannot fail to be struck by this particularly in the Robin Hood ballads, where so much that is beautiful and artistic alternates awkwardly with the bald and prosy verbiage of the mere rhymester. 'The loyalty, good-humour, and the love of the free air and the green-wood remain, but the clerks have spoiled the praise of Robin Hood, the good outlaw.' Perhaps this is in great measure due to the early printing of much of the English popular poetry in the form of broad-sheets. These were subjected by half-educated editors and printers to a kind of preparation for the press which too often succeeded in stripping the poor ballads of almost all their poetic charm. The printed ballads were scattered broadcast over England, and often pasted on the walls of chambers in country-houses, where they were sometimes fortunate enough to catch the eye of a reader whose sympathies ranged wider than his culture. 'I cannot, for my Heart,' says *The Spectator* (No. 85), 'leave a Room before I have thoroughly studied the Walls of it, and examined the several printed Papers which are usually pasted upon them;' and he describes further how that on a wall he found 'the old ballad of *The Two Children in the Wood*, which is one of the darling songs of the common people.' The people 'love a ballad but even too well, if it be doleful matter merrily set down, or a very pleasant thing indeed and sung lamentably,' and Mopsa's preference for a ballad in print, 'for then we are sure they are true,' may be taken as expressing a not uncommon popular feeling. Indeed the whole passage referred to (*Winter's Tale*, IV. iv. 181–330) throws great light on the subject of the old broadsides, and the warm liking of the people for them. These printed broadsides were long as dear a solace to the southern rustic as the traditional ballads were to his fathers, though by passing through a series of unintelligent and unsympathetic recensions many of them had become so bald as to deserve Dr Johnson's parody:

> I put my hat upon my head, and went into the Strand,
> And there I saw another man, with his hat in his hand.

In our traditional ballads we must not look for exact dates; but there is ample evidence that a large part of our traditional ballad poetry existed in much the same form as now, more than three hundred years ago. Many of the themes, of course, are much older, and undoubtedly many of the versified ballads also. Already in *The Vision of Piers Plowman* (Skeat's ed., C. Passus viii. 10–12), in the second half of the 14th century, we find Robin Hood a hero of popular song. Sloth says:

> Ich can nouht parfytliche my *pater-noster* as the prest hit seggeth,
> Ich can rymes of Robyn Hode, and of Randolf, erl of Chestre,
> Ac of our lord ne of oure lady, the lest that evere was maked.

Barbour tells us (*The Brus*, book xvi. 520–22, Skeat's ed.; xi. 524–26, Jamieson's ed.) that he thinks it unnecessary to rehearse the account of a victory gained in Eskdale over the English, because:

> For q'ha sa likis, thai may heir
> Young women, quhen thai will play,
> Syng it emang thame ilke day.

Leslie, in that chapter in his *History of Scotland* (1594) devoted to the Border manners, notices particularly the taste of the marchmen for music and ballad poetry. But we need not suppose that the only ballads they cared for were those of battle and bloodshed. Their rude and turbulent lives, full of danger and death, had in them the elements of rare romantic interest, and the pity of life must ever have been present to them as a rich artistic motive that would inspire the poetry of passion and pathos, of despair, or hopeless and interrupted love.

But our popular poetry was for generations the possession of the people alone: it was long before it attracted the notice of the learned at all. Shakespeare knew the old romantic ballads, and worked snatches of them with fine effect into his dramas. Sir Philip Sidney could say: 'I neuer heard the olde song of Percy and Duglas that I found not my heart mooued more then with a Trumpet: and yet is it sung but by some blinde Crouder, with no rougher voyce, then rude stile.' Ben Jonson used to say he would rather have been the author of it than of all his works; and Addison commended the 'majestic simplicity' of the same ballad in two fine papers of his *Spectator* (70 and 74). Yet the ballads continued to be neglected, and it was not till Bishop Percy published his famous *Reliques of Ancient English Poetry* in 1765, that Englishmen awakened to the fact that their popular poetry was poetry at all. Among the ballads in this collection were such masterpieces as 'Childe Waters,' 'Glasgerion,' 'Edom o' Gordon,' 'Edward, Edward,' 'The Jew's Daughter,' 'Old Robin of Portingale,' 'Sir Aldingar,' 'King Estmere,' 'Sir Patrick Spens,' and 'Gil Morice.' Percy admits in his preface that he had made 'a few slight corrections or additions,' as the old copies were 'often so defective and corrupted, that a scrupulous adherence to their wretched readings would only have exhibited unintelligible nonsense, or such poor meagre stuff as neither came from the bard nor was worthy the press.' Perhaps no book ever had a greater or more immediate effect. 'I do not think,' says Wordsworth, 'that there is an able writer in verse of the present day who would not be proud to acknowledge his obligation to the *Reliques*.' The same return to the simplicity of truth and nature took place about the same time in France and Germany, and erelong showed its results as plainly in the lyrical work of André Chénier, of Goethe, Schiller, and Heine. From the *Reliques* Scott drew directly the inspiration that made him a poet and more. In 1802 appeared at the provincial press of Kelso the first two volumes of his *Minstrelsy of the Scottish Border*, the richest single collection of popular poetry that has ever been published. From the publication of this book the northern ballads permanently took their place in public estimation as one of the best and purest sources of English poetry. It was fortunate for English literature that the Border ballads secured, before it was too late, an editor in whom the antiquary had not drowned the poet. Many of the poems were the fruit of raid after raid into Liddesdale, and were in part actually taken down from the living lips of the old men and women who still knew them by heart. It may be regretted, from the point of view of the scientific student, that Scott did not print his texts exactly as he got them, but reference to his originals is possible in some cases, and shows us that Scott's changes—not always for the better—were not by any means so great as might be supposed. Of course, in many cases it is impossible now to say exactly how much they owe to the poetic touch of Scott himself, and we know that it was possible for him to be taken in by ingenious friends; still there is proof enough that here we have what is substantially a body of traditional poetry that fulfils the strictest

conditions of the ballad, and is yet of uncommonly high poetic value. The influence which Percy's and Scott's ballads have had on poetry is enough to prove their intrinsic poetic power: their straightforward diction and artless melody at once became a powerful influence in literature, and made themselves felt in the work of Coleridge, Wordsworth, Keats, Tennyson, Rossetti, and indeed every succeeding poet. Even the zeal of later imitative poetasters, however little according to knowledge, is a tribute to the poetic influence of the form that dominated them, although it did not save them from those faults of obscurity and quaint vagueness of expression, looseness of versification, and inaccuracy of accent, which not unfrequently accompany the merits of the model. Succeeding editors added to Scott's work, Robert Jamieson printing in his excellent collection in 1806 as many as fifteen ballads not before published: among them, 'Burd Helen,' 'Willie and May Margaret,' 'Young Beichan,' and 'Alison Gross.' Motherwell's originals, printed in 1827, were of less value, but many of his alternative oral versions were interesting and important, while his learned introduction contained a good survey of the subject, full of the indignant eloquence of the warm apologist, as well as the sympathetic insight of the poet. Peter Buchan's collection, published in 1828, professed to give north-of-Scotland popular versions, which were discovered to be strangely bald in style, and barren of poetic quality. In the hands of the later editors, the proportion of dross to ore grew larger with each collection, while the modern arts of life killed the conditions which propagated and preserved the ballad. The work of many of the later ballad editors showed no little erudition, though some evidently had more care for the cobweb than relish for the wine. Whether the incidents recorded are historical or legendary, or whether they are partly both; whether the ballads belong to the 16th, or 15th, or any particular century; whether Lady Wardlaw, or any one else, ever added a line, or left one out, are after all questions of but little moment to the Englishman proud of possessing the richest body of popular poetry in the world, and which bears upon its face, in the impossibility of its being imitated, the only evidence of genuineness and antiquity worth anything at all.

Still less important look the discussions of the editors in the light of the results gained from the comparative study of folk-songs. We find that many of our traditional ballads have the same tone, the same incidents, the same iterations of words and ideas as the traditional ballads of Scandinavia, of Greece, of Germany, of Italy, of France, and of Spain. This discovery widens our interest in the question enormously. It strips it of something of its parochial and national interest, but it adds an interest to it that is conterminous with our civilisation itself. The plots and situations of many of our traditionary folk-songs are the immemorial inheritance of Celts and Saxons, of Greek and Slavonic peoples—of unknown and prehistoric antiquity. Like our folk-tales, they do not belong to one nation in particular, but are the property at least of all the peoples of the Aryan family. 'There are certain incidents,' says Lang, 'like that of the return of the dead mother to her oppressed children; like the sudden recovery of a fickle bridegroom's heart by the patient affection of his first love; like the adventure of May Colvin with a lover who has slain seven women, and tries to slay her; like the story of the bride who pretends to be dead, that she may escape from a detested marriage, which are in all European countries the theme of popular song.' Ballads, of course, have a narrower range than tales. There is here and there a trait common to Europe and Asia, but the ballads are substantially European. Each nation has a set of its own—not always large—besides the stock in common. It is idle, then, to quarrel any longer over the origin and authorship of these ballads. It is still true, of course, that we have some more or less historical ballads, and that even our purely romantic and non-historical ballads have been powerfully modified by local influences; but the fact remains that a large number of our ballads, and many of their characteristic incidents and qualities, though not their literary style, are not due to the poetic instincts of our own countrymen in particular, but were carried scores of centuries ago in the memories of our distant progenitors from the primeval home of our race. They form part of the stock of primitive folk-lore, and a study of them on the comparative method may be expected to lead to important constructive results in the hands of future scholars. The materials for such study were made available for the first time in Professor Child's monumental edition of the *English and Scottish Popular Ballads* (originally published in parts, 1882–98, and then in five folio volumes), with its learned and luminous introductions to each ballad, culled from a thousand volumes in every language of Europe.

But entirely apart from questions of origin, our popular ballads will repay the most diligent study on their literary side alone. As works of art in which a stock of primitive ideas and incidents has been preserved in poetic dress, they form a perennially valuable portion of our literature, and, as has been shown, they formed the chief factor in that naturalistic reaction from which has flowed the richest stream of nineteenth-century poetry, not yet exhausted after a hundred years. The Robin Hood cycle of ballads and the north-country and Border ballads are the two largest and richest collections of ballad poetry that remain to us; but as has been proved, the latter is infinitely the higher in lyrical quality. The Robin Hood ballads are some forty in number, but include much repetition both of phrase and incident. More than half a dozen are variants of the same story of Robin's meeting an unknown traveller—a tinker, butcher, tanner, shepherd, curtal friar, or beggar—straightway fighting with him, being beaten, and then, in good-humoured admiration of his antagonist's prowess, at once enlisting him in his band of honest outlaws. Among the best ballads of the group are 'Robin Hood and Guy of Gisborne' and 'Robin Hood and the Monk,' the last a good and right spirited heroic tale. The *Lytell Geste* is a set of eight connected ballads, grouped for us by some early and not unskilful editor. 'If the ballads as a whole be tedious,' says Allingham, 'the central figure (whithersoever or howsoever come) is a clear and delightful one, of that small class of ideal personages to which Don Quixote and Robinson Crusoe also belong—a bold, generous, and courteous outlaw, famous in archery, living under greenwood-tree with his merry men, taking from the rich and giving to the poor—a figure that, once lodged in the popular imagination, became an easy and favourite subject for one rhymester after another.' Of all our ballads, the palm for poetry must be given to those especially connected with Scottish and English Border life and story. These formed the richest part of Scott's collection, which contained altogether more than forty ballads never published before, among them such masterpieces as 'Thomas the Rhymer,' 'The Dowie Dens o' Yarrow,' 'The Wife of Usher's Well,' 'Annan Water,' 'The Douglas Tragedy,' 'The Lament of the Border Widow,' 'Clerk Saunders,' 'The Sang of the Outlaw Murray,' and 'Kinmont Willie'; as well as good fresh versions of 'Lord Randal,' 'Helen of Kirkconnell,' 'Tamlane,' and 'The Lass o' Lochryan.

'Kinmont Willie' can hardly be overpraised as a masterpiece of the heroic ballad, unequalled in fire and speed. The reader is carried along in a whirl of sympathetic excitement, and is left no time to wonder at the marvellous fitness and truth of the words and images. Fighting ballads like this have high historical as well as poetical value, for they reflect closely and accurately the manners and life of the particular people who produced them; and doubtless they had their influence on the rude people who preserved them. The paradox of Fletcher of Salton may be admitted to contain at least some measure of truth: 'I know a very wise man that believed that if a man were permitted to make all the ballads [including also songs], he need not care who should make the laws of a nation.' Some of the fighting ballads of the Border are so vivid and vigorous that we feel the singer had himself ridden in the foray, had heard with his own ears the very clash of steel; nor indeed need the minstrel have struck a feebler blow because he had an ear for ballad metres. The old Border life was rough and rude, but the blood-stains on its grassy holms have watered for us flowers that are among the rarest in the garden of English song. Above all our ballads in value stand those that have clustered round the Yarrow—'fabulosus as was ever Hydaspes.' Its story of love stronger than death has been one of the most potent charms in the world of English poetry, and has drawn some of the finest verse that has ever been written from Hamilton of Bangour, Logan, and Wordsworth.

The best collection of ballads, in all their varying versions, is Prof. Child's great work, *English and Scottish Ballads* (5 vols. 1882–98; superseding his earlier collection, 8 vols. 1857–59); and a one-volume edition, edited by Mrs Child Sargent and Prof. Kittredge (1904), contains all but five of the 305 ballads. Allingham's is a good anthology (1864); and a serviceable collection is *The Ballad Minstrelsy of Scotland* (Glasgow, 1871). Among notable collections have been: *A Collection of Old Ballads* (3 vols. Lond. 1723–25); Percy's *Reliques of Ancient English Poetry* (3 vols. 1765; a beautiful and excellent ed. by H. B. Wheatley, 3 vols. 1886); Herd's *Ancient and Modern Scottish Songs, Heroic Ballads, &c.* (1769; 2 vols. 1776); Johnson's *Scots Musical Museum* (6 vols. 1787–1803; 3d ed. by Stenhouse and David Laing, 4 vols. 1853); Ritson's *Robin Hood: a Collection of all the Ancient Poems, Songs, and Ballads now extant, relative to that celebrated English Outlaw* (2 vols. 1795; re-edited by Gutch, *A Lytell Geste*, 2 vols. 1847); Scott's *Minstrelsy of the Scottish Border* (3 vols. 1802–3, with its admirable introduction and notes); Robert Jamieson's *Popular Ballads and Songs* (2 vols. 1806); Kinloch's *Ancient Scottish Ballads* (1827); and Motherwell's *Minstrelsy, Ancient and Modern* (1827), with an excellent introduction.

Other collections, but of less importance, are Thomas D'Urfey's *Pills to Purge Melancholy*, containing a ballad here and there (6 vols. 1719–20); Allan Ramsay's *Evergreen* (2 vols. 1724), and *Tea-table Miscellany* (3 vols. 1724–27; afterwards augmented with a fourth volume); Pinkerton's *Select Scotish Ballads* (2 vols. 1783); Ritson's *Select Collection of English Songs* (1783), *Pieces of Ancient Popular Poetry* (1791), *Ancient Songs and Ballads* (2 vols. 1792), and *Scottish Song* (2 vols. 1794); Finlay's *Scottish Historical and Romantic Ballads* (2 vols. 1808); Thomas Evans's *Old Ballads* (2 vols. 1777; enlarged ed. by R. H. Evans, 4 vols. 1784); Gilchrist's *Collection of Ancient and Modern Scottish Ballads* (2 vols. 1815); Hogg's *Jacobite Relics* (2 vols. 1819–21); David Laing's *Select Remains of the Ancient Popular Poetry of Scotland* (1822); C. K. Sharpe's *Ballad Book* (1824); Maidment's *North Country Garland* (1824); Kinloch's *Ballad Book* (1827); P. Buchan's *Ancient Ballads and Songs of the North of Scotland* (2 vols. 1828); Dr Robert Chambers's *Scottish Ballads* (1829); Whitelaw's *Book of Scottish Ballads* (1845); J. P. Collier's *Book of Roxburgh Ballads* (1847); Aytoun's *Scottish Ballads* (2 vols. 1857); and Maidment's *Scottish Ballads* (2 vols. 1868).

The publications of the Percy Society embraced 30 vols. (1840–52), a few of them pertaining to ballads. Indispensable books are Chappell's *Popular Music of the Olden Time* (1855–59; new ed. 1893), and Hales and Furnivall's reprint of the *Percy Folio Manuscript* (3 vols. 1867–68), in which we get behind the good bishop, and see his conception of an editor's duty, and how well on the whole he deserved the wrath of the surly but honest Ritson. It was a surprise to the world to discover that of his 180 ballads, there were only 45 that Percy had taken from his famous manuscript. In 1868 Furnivall succeeded in founding the Ballad Society, which published, mainly under the enthusiastic and untiring editorship of Ebsworth, the Bagford ballads, the Roxburghe ballads almost entire, and other unprinted collections. The great collection of ballads made by the famous Pepys still remains buried in the library of Magdalene College, Cambridge.

For comparative study may be named the following collections: For France, E. Rolland's *Recueil de Chansons Populaires* (6 vols. 1883–88); for Denmark, Svend Grundtvig's *Danmark's Gamle Folkeviser* (Copenhagen, 1853–90); for Germany, F. K. von Erlach's *Die Volkslieder der Deutschen* (5 vols. Mannheim, 1834); for Italy, Giuseppe Pitré's *Canti Popolari Siciliani* (2 vols. Palermo, 1870); and for Spain, Francisco Rodríguez Marín's *Cantos Populares Españoles* (Seville 5 vols. 1882–84). See also Countess Martinengo-Cesaresco's *Essays in the Study of Folk-songs* (1886), and most of the sixty-nine books named in her list of books consulted.

See Alexander Smith's 'Scottish Ballads' in *Edinburgh Essays* (1856); Hewlett's 'Modern Ballads' in the *Contemporary Review* for November 1875; Andrew Lang's article in vol. iii. of the 9th edition of the *Encyclopædia Britannica*, and his introduction to the selection in vol. i. (1880) of Ward's *English Poets;* Veitch's *History and Poetry of the Scottish Border* (1877; new ed. 1893); Russell's *Haigs of Bemersyde* (1881); Geddie. *The Balladists* (1900); Frank Sidgwick, *Popular Ballads of the Olden Time* (1905–7); Gummere, *The Popular Ballad* (1907); Graves, *The English Ballad* (1927).

Ballade, a term applied to a poem consisting of one or more terns or triplets of seven- or eight-lined stanzas, each ending with the same line as refrain, and usually an envoy, as Chaucer's *Compleynt of Venus* and *To his Purse.* The foregoing is the strict application of the term—it is now frequently used somewhat more loosely of any poem divided into stanzas of equal length. This form, a favourite of Villon and many of the older French poets, was revived by De Banville, Swinburne, Andrew Lang, Austin Dobson, and others.—In music the term is quite vague. See CHOPIN.

Ballanche, PIERRE SIMON, a French philosopher, was born at Lyons, 4th August 1776, and settled at Paris in 1814, having attracted some notice by his essays and a prize poem, *Antigone.* His great work is the *Palingénésie Sociale* (1828), in which he seeks to illustrate the workings of God in history, and sketch how human society may and will be reconstructed so as to attain to its highest development. His works are a strange mixture of mysticism, socialism, and the philosophy of history. His *Vision d'Hébal* (1832) is a prophetic forecast of the world's history, Hebal being a second-sighted chief of a Scottish clan. Ballanche, who was a member of the Academy, died 12th June 1847. See his Life by Ampère (1848).

Ballantine, JAMES (1808–77), artist and poet, born in Edinburgh, was brought up as a house-painter, but afterwards learned drawing under Sir William Allen, and was one of the first to revive the art of glass-painting. He was commissioned to execute the stained-glass windows for the House of Lords, and in 1845 published a treatise on *Glass Staining*, which was translated into German. Two prose volumes, *The Gaberlunzie's Wallet* (1843), and *Miller of Deanhaugh* (1845), contain some of his best known songs and ballads. He was author of *Poems* (1856 and 1865); *One Hundred Songs with*

Music (1865); *Life of David Roberts, R.A.* (1866), and *Lilias Lee* (1871).

Ballantine, WILLIAM (1812–87), serjeant-at-law, son of William Ballantine, for many years a magistrate at the Thames Police Court, was called to the bar in 1834, and soon obtained a large practice, chiefly in criminal cases. He was created a serjeant in 1856. Amongst the famous trials with which he was associated were the Müller murder trial, Tichborne case, and the defence of the Guicowar of Baroda. From the latter he is said to have received a fee of 20,000 guineas to induce him to visit India. See his *Experiences of a Barrister's Life* (1882); and his *Old World and the New* (1884), an account of a visit to America.

Ballantrae, a fishing-village at the mouth of the Stinchar, in the S. of Ayrshire, 10 miles WSW. of Pinwherry station on the Girvan and Portpatrick Railway. It is the headquarters of the south-west fishery district of Scotland. Fish-curing is largely carried on. The population is about 700.

Ballantyne, JAMES (1772–1833) and JOHN (1774–1821), Scott's printers, were the sons of a merchant of Kelso, where in 1783 they were both at school with Sir Walter. James was bred for the law, but in 1797 he started the Tory *Kelso Mail;* and in 1802, having already printed some ballads for Scott, he produced the first two volumes of the *Border Minstrelsy.* The beauty of their typography established his fame as a printer; and towards the close of that year he removed, at Scott's suggestion, to Edinburgh, and set up two presses near Holyrood. In 1805 Scott became a secret partner in the business, which in 1808 expanded into the printing, publishing, and bookselling firm of John Ballantyne & Co., Scott having one-half share, and each of the brothers one-fourth. 'Aldiborontiphoscophornio' and 'Rigdumfunnidos' were Scott's nicknames for pompous James and sporting John; he seems to have liked them both, though sometimes he might plead 'For heaven's sake, treat me as a man, and not as a milch cow.' As early as 1813, bankruptcy threatened the firm, and though its unsaleable stock (Scott's own rash ventures mainly) was disposed of to Constable in 1818, it was hopelessly involved in Constable's ruin (1826). John had died bankrupt five years earlier; and James, after the settlement of affairs, was employed by the creditors' trustees in editing the *Weekly Journal,* and in the literary management of the printing-office. See works referred to under SCOTT; and *History of the Ballantyne Press* (Edin. 1871).

Ballantyne, ROBERT MICHAEL, nephew of the preceding, a writer of admirable tales for boys, was born at Edinburgh in 1825. His first book, issued in 1848, was a record of personal experiences during a six years' residence (1841–47) in the territories of the Hudson Bay Company. In 1856 he took to literature as a profession, making it his aim as far as possible to write from personal experience, and introducing interesting facts and descriptions. His first tales were founded on experiences in the backwoods of Rupert's Land, among the fur-traders and Red Indians; the *Lighthouse* was written after a short residence in the Bell Rock lighthouse; *Erling the Bold,* after a visit to Norway; and *The Settler and the Savage,* after a visit to the Cape. Author of some eighty volumes and an accomplished artist in water-colours, he died at Rome, 8th February 1894. See his *Personal Recollections* (1893).

Ballarat', or BALLAARAT, a thriving city of Victoria, next in importance to Melbourne. Owing its rise to the discovery of gold there in October 1851, it is still the centre of a rich gold-field; when the surface diggings became exhausted after the first rush, deposits were found at greater depths. It is 76 miles WNW. of Melbourne, and 58 miles NW. of Geelong. Ballarat, or Ballarat West, and Ballarat East, separated by the Jarrowee Creek, are separate municipalities. The former was made a municipality in 1855, and a city in 1870. Being 1440 feet above the sea-level, Ballarat enjoys an exceptionally cool and healthy climate. It is the see of Protestant and Roman Catholic bishops. There are two town-halls, some fifty churches, several colleges, and grammar-schools. Among the industries are iron-founding, brewing, distilling, with flour and woollen mills. The 'Welcome Nugget,' discovered in 1858 at Bakery Hill, weighed 2217 oz. 16 dwt., and was sold for £10,500. The South Star shaft is well over 3000 feet deep. In 1854 the indignation of all Victorian gold-miners at unjust taxation culminated in a rising at Ballarat, known, from the mine on which the rioters made their camp, as the Eureka Stockade. The movement was soon dominated by foreigners and political rebels from Europe, who tried to convert it into a revolution, and it collapsed almost immediately thereafter; but the miners' grievances were remedied. Pop. (1901), Ballarat, 25,448; with Ballarat East, 43,710; (1911) 52,551; (1921) 38,500.

Ba'llater, a village of Aberdeenshire, on the Dee, 43 miles WSW. of Aberdeen, with medicinal springs and Balmoral Castle near it.

Ballenstedt, a town of Anhalt, in the Harz Mountains; pop. 6000.

Ballet, a theatrical exhibition, composed of dancing, posturing, and pantomimic action. Both the religious ceremonies of the Greeks and the dramatic representations which sprang from them were largely intermingled with dancing, and the Roman pantomimes bore a strong resemblance to a modern *Ballet d'Action,* which is a play carried out in dumb show. Such ballets were or are specially popular in Italy and France, where enormous sums used to be spent on their production. In Britain a ballet is usually a mere episode in an opera or play, or a part of what in England is called a Pantomime (q.v.).

Ball-flower, an ornament like a ball placed in a circular flower, characteristic of Decorated Gothic architecture.

Ballina', a seaport in Mayo, on the confines of Sligo. It was taken by a French force in August, 1798. Pop. (1926) 4872.

Ballinasloe', a market town in Galway; pop. (1926) 5243.

Balliol. See BALIOL, OXFORD.

Ballista, or BALISTA, a Roman military engine, resembling a huge cross-bow, which propelled large and heavy missiles by means of a tightly twisted rope of hemp, flax, catgut, sinew, or hair, or by violent movement of levers.

Ballistic Pendulum. See GUNNERY.

Balloons and Aeroplanes. It has from time immemorial been the ambition of man to soar in the air and to utilise the highway of the heavens. At first the idea was to emulate the birds and to enjoy the experience of floating in mid-air. Later on, however, as the invention became more practical, it developed into a question of economical transport.

I. HISTORY.—As regards the history of human flight, we find numerous allusions to the subject in early writers; but, setting aside mere legends, such as those of Dædalus and Icarus, we read of Archytas of Tarentum, who in 400 B.C. is said to have constructed an artificial dove to fly. Roger Bacon, in the 13th century, wrote suggestions which seemed to foreshadow the balloon, speaking of 'a large,

hollow globe of copper or other suitable metal wrought extremely thin, and filled with etherial air or liquid fire, and launched into the atmosphere.' Bishop Wilkins published first in 1648 his book called *Mathematical Magick*, in which he discusses the possibilities of human flight. He here relates how Simon Magus, having challenged St Peter to 'do miracles with him' at Rome, attempted to fly from the Capitol to the Aventine Hill; but St Peter's prayers 'did overcome his sorceries,' and violently brought him to the ground and broke his thigh, and 'within a while' he died. 'About the Confessor's time' an English monk named Elmerus is said to have flown from a tower for almost a furlong. Accounts are also given of Regiomontanus of Nuremberg, who is said to have made an artificial eagle in the 15th century. The versatile Leonardo da Vinci has left a number of sketches and notes referring to inventions for flying, which show a very sound grasp of the subject. In 1670 Francis Lana published a book in which he described, with illustrations, a method of navigating the air by means of four large copper vessels exhausted of air. In the 17th century J. B. Dante framed some wings by which he flew, but, after several successes, finally fell and broke his thigh. In 1678 one Besnier constructed an apparatus, consisting of four wings attached to his hands and feet, by which he could at least descend from an eminence, and even cross a river. In 1709 a friar named Bartholomew Laurence de Gusman presented to the king of Portugal a design for a flying-machine. Many other suggestions, more or less fanciful, were put forward, though no full descriptions remain to enable us to judge as to their real value. A complete change in ideas for the navigation of the air occurred when, in 1766, Cavendish discovered that hydrogen (then called 'inflammable air') was at least seven times lighter than atmospheric air; and Dr Black, in lecturing on the subject, distinctly stated that if a light receptacle were filled with hydrogen it would rise up in the air. He even tried the experiment, but not on a large enough scale, and he was unable to find any substance which was sufficiently gas-tight and yet light enough to rise. Cavallo, a few years later, succeeded in inflating soap-bubbles with hydrogen, which rose to the ceiling, and this experiment was henceforth frequently repeated. But it was on different lines that the first balloon was made. The brothers Montgolfier of Annonay, noting how smoke rose in the air, bethought them to enclose some smoke in a large paper bag, so as to form an artificial cloud. In this they succeeded, and sent aloft the first fire-balloon in 1782. After many and various trials, a public demonstration was given on 5th June 1783. The balloon consisted of an immense bag of linen lined with paper, having a capacity of some 23,000 cubic feet. It was inflated by lighting a fire of chopped straw under the aperture at the bottom. The machine ascended to a height estimated at 6000 feet. This extraordinary experiment having become the talk of the day, it was not unnatural that the more scientific exponents began discussing the possibility of Dr Black's ideas being carried out in a practical way; and M. Charles, a professor of experimental philosophy in Paris, at once set about constructing a gas-balloon. It was about 13 feet in diameter. On 27th August this machine made its first public ascent from the Champs de Mars before a huge assemblage. It rose into the clouds, and travelled for 15 miles before descending; but on landing it caused the greatest consternation among the superstitious peasants. On the 15th of October 1783 the first actual ascent was made by a man. M. Pilâtre de Rozier on that day made several captive ascents in a Montgolfier balloon. On the 21st November the first free ascent was made by M. de Rozier and the Marquis d'Arlandes, who, ascending from the Château de la Muette, made a voyage lasting about twenty minutes. But again M. Charles was not to be outdone, and accordingly he, together with M. Robert, made an ascent in a hydrogen balloon on 1st December 1783. This balloon was wonderfully like the ordinary balloon that we use to-day. The voyage lasted about two hours; but as there was still plenty of gas left, M. Charles again ascended alone, and attained an elevation of nearly 10,000 feet. The first ascent in England was made on 15th September 1784 by Vincent Lunardi, secretary to the Neapolitan Embassy, who published a most delightful account of his trials and experiences; though J. Tytler had a few weeks previously made a short ascent in a fire-balloon in Edinburgh. The first demonstration of the non-insularity of Great Britain, from the aeronautical point of view, was when, in 1785, Blanchard, the first professional aeronaut, accompanied by Dr Jeffries, an American, crossed the Channel from Dover to the Forest of Guiennes. Shortly after this occurred the first disaster, when in the next attempt to cross the Channel the intrepid Pilâtre de Rozier lost his life. The balloon he used is of interest as an attempt to improve upon the system, though in a misconceived manner. Since the fire-balloon has the advantage of being able to rise and sink as desired by merely adding more or less fuel, while the gas-balloon has the advantage of better lift, this inventor thought of combining the two, placing a hot-air compartment below the gas-reservoir. The result was of course disastrous, for before the machine had been in the air a few minutes the hydrogen took fire, and Rozier and a companion were dashed to the ground. Many fatalities occurred before the real dangers of ballooning became apparent. Count Zambeccari, in Italy, was killed through the ignition of his fire-balloon; Madame Blanchard took up a set of fireworks, which set alight the gas, and she was killed.

Although no very striking events occurred during the earlier part of the 19th century, many notable ascents were made. The Sadlers, father and son, made attempts to cross the Irish Channel, and had thrilling adventures in doing so. Mr Windham Sadler lost his life in an accident in 1824. Charles Green, perhaps the greatest of aeronauts, introduced the practice—which resulted in ballooning becoming much more popular—of inflating with coal-gas instead of the costly hydrogen. In 1836 he, together with Messrs Holland and Monk Mason, made the memorable journey, which for long remained a record for ballooning, of going from London to Weilburg in Nassau. This lasted 18 hours, and was said to be 500 miles, although from point to point it was certainly nothing like so much. About this period (1835) John Wise commenced his great career as an aeronaut, making ascents all over the United States. He made one voyage, in 1859, of 850 miles, and he formulated a project for crossing the Atlantic in a balloon. Nadar, a Parisian photographer, had for some years been strenuously advocating the navigation of the air by 'heavier-than-air' machines. Having written much on the subject, he next adopted the rather odd course of building a huge balloon, to be the last of its kind, and to make a series of voyages which were to bring in a goodly sum to be devoted to his cause. The 'Géant' was of 215,000 cubic ft. capacity, and had a small balloon attached below the main one to receive the excess of gas. The first ascent was made on 4th October 1863 with 15 passengers, but it did not last very long, and a rough descent was made near Meaux. A fortnight later a second ascent was made, but after a voyage of 17 hours a still worse descent was effected, the car being dragged

along the ground for some miles, and most of the passengers being severely hurt.

In 1862 began the series of ascents by Glaisher, of the Greenwich Observatory, piloted by Coxwell, for the purpose of the scientific investigation of the upper air. During the seventh ascent, on 5th September, a height of 29,000 feet was reached, when both aeronauts became nearly insensible, and it was conjectured that they eventually attained a height of 7 miles. Coxwell, unable to use his arms, pulled the valve-line with his teeth. During the siege of Paris in 1870 a number of balloons were used to take letters and passengers out of the city. Most of the balloons were specially constructed, two regular factories being started for the purpose. In all 67 balloons (including one without a man) left Paris, carrying 164 persons, 381 carrier-pigeons, and about 23,000 lb. of letters and despatches. In 1875 a terrible disaster happened to a balloon in France, which went up for scientific observations. After rising to about 23,000 feet, notwithstanding that the aeronauts were provided with oxygen-tubes all three became insensible, and when M. Gaston Tissandier came to, he found that his two companions, Messrs Croce-Spinelli and Sivel, were dead. It is supposed that they had ascended to 27,950 feet. On 4th December 1894 Dr Berson ascended from Berlin, and attained a height of just over 30,000 feet, the record for well-ascertained altitude. What was undoubtedly the most hazardous journey ever undertaken was when, in 1897, Andrée, together with two companions, Strindberg and Fraenkel, left Spitsbergen in a balloon of 162,000 cubic ft. to attempt to get to the Pole. Since the start on 11th July nothing more has been heard of them except for a pigeon-message, dated nearly 48 hours later, saying all was well. In October of that year a large balloon, which had been used as a captive at the Leipzig Exhibition, ascended with 8 passengers, and remained up for 24 hours. It is computed to have travelled 1032 miles, the longest journey hitherto made. A very long journey was made in 1905 by Dr Wegener in Germany, when he remained in the air for 52 hours. The following year Count de la Vaulx travelled from Paris to Korostischeff in Russia, a distance of nearly 1200 miles, in 35½ hours. The longest sojourn in the air, however, was achieved by Colonel Schaeck, representing Switzerland in the Gordon-Bennett race in 1908. He remained in the air for 73 hours, travelling from Berlin to Borgset in Norway. The longest journey from England was made also in 1908, Messrs Gaudron, Turner, and Captain (afterwards General) Maitland travelling 1117 miles from London to Russia.

A word should be added about the small balloons sent up with automatically recording instruments for meteorological observation. During the last few years systematic ascents have been organised, bringing results of the highest importance to our knowledge of the upper atmosphere. Observations have been recorded at heights of over 16 miles above the earth.

Captive Balloons.—As has been said, in the first ascent of a human being in a balloon the machine was held captive by a rope, and since that time captive balloons have frequently been used for many purposes. Only ten years after the first ascent such balloons were used by the French in the campaign in Flanders, notably at the battle of Fleurus. They were also used in the American Civil War. In later years captive balloons were often made a feature at various shows, carrying up passengers to see the view. The largest ever made was that at the Paris Exhibition of 1878, which contained 883,000 cubic ft. of hydrogen and could carry up 52 people at a time. They have more recently been generally adopted for military purposes, but it was in the recent great war that they were developed beyond all precedent, many hundred 'kite-balloons,' of an elongated shape with an air-inflated fin tail, being employed on both sides. In the future such vessels are likely to be much used as landmarks over aerodromes.

Dirigible Balloons or Airships.—Soon after the first balloon ascents had been made, it became evident that if the invention was to be of real use some means must be found whereby the apparatus could be driven in a given direction, instead of being carried along exactly with the wind. At first various forms of sails and rudders were suggested, but these, of course, were of no avail. The mere fact of adding extra surfaces to the machine could have no effect in altering its course, however they might be disposed. Then it was proposed to apply power to screw or other propellers, although in these early days no engines of suitable power for their weight were available. General Meusnier elaborated a scheme which is practically the dirigible of to-day; but it was not till 1852 that Giffard, the inventor of the Injector (q.v.), made an actual balloon of elongated form to be driven with a screw-propeller rotated by a steam-engine. This, however, was not a great success, since the heaviest engine he could carry only developed about 3 horse-power, which later experience has proved to be altogether inadequate. Other inventors followed with no better success, till the French government, realising how important such a machine might be in war, constructed an airship to the design of Colonel Renard, which, driven by an electric motor of 9 horse-power, succeeded in making several long return journeys in the neighbourhood of Paris. This was in 1885. In 1898 and following years a young Brazilian, Santos-Dumont, constructed a number of small dirigibles, with which he created a great deal of public interest, and made many successful journeys. Meanwhile, in Germany, Count Zeppelin, who had long made a study of the subject, built one of his huge airships, with a rigid frame of aluminium, and, after many failures, succeeded in 1900 in making some satisfactory trips. Quite a number of new machines were brought out about this time, including two—those of Baron de Bradsky and M. Severo—which met with disaster, resulting in the deaths of their aeronauts. Among other airships which made their appearance about this time was that constructed for Messrs Lebaudy to the designs of M. Julliot. This vessel may be considered as the first undoubtedly successful dirigible, as it was capable of travelling some 25 miles an hour, and made about sixty entirely successful journeys before it was taken over by the military authorities. In Germany considerable progress was made with various different types. In addition to the several Zeppelins which were in turn constructed, Major von Parseval designed some of a non-rigid form, which acted very satisfactorily; and Major Gross built others for the government of a semi-rigid kind. In France a new type was developed at the Clement-Bayard works. During the year 1910 a number of events occurred which tended to check the progress of the dirigible. Four large Zeppelins were wrecked, two of the Lebaudys came to grief, and other airships also met a similar fate. During the same year two large dirigibles came over to England from France—one the Clement-Bayard II., which was bought for the government; the other the Lebaudy, which was acquired by the *Morning Post* with the object of presenting it to the War Office. Opinions were at this date still much divided as to the desirability of acquiring either of these in view of their doubtful efficiency. Not much progress followed. Willows and others in England built several small airships which achieved some success. A type of Zeppelin, but with a wooden framework, was tried in Paris, and a good deal was accomplished with small vessels in the

United States. The main advance was with the Zeppelin machines in Germany. Many large vessels were built, and a regular installation of such machines was established in several of the principal German towns for pleasure-trips. The German government, foreseeing the uses to which they could be applied in war, gave support to the movement, and acquired several vessels for military use. The first naval airship of this kind in 1912 covered a distance of over 1000 miles in a 30-hour flight. In May 1914 the latest Zeppelin made a cruise of 34 hours, during which it attained the unprecedented height of over 10,000 feet. When hostilities broke out in 1914 Zeppelins were consequently well to the fore. Germany possessed about 23 airships at this time. The British government owned 3 small ones. In December occurred the first of the many raids over England. These were mostly carried out during the night, and a great many large bombs were dropped; though, happily for us, the majority fell in open country.

About forty such raids were undertaken, and at first we seemed to be unable to do much to prevent them. However, our aerial defences became better organised, and on 3d September 1916 the first of these raiding airships was destroyed by an aeroplane, being brought down in flames at Cuffley. Late in the same month two others were shot down, and a fourth Zeppelin was destroyed within a month. Other vessels on their return from a raid were forced to descend in France. These disasters to the German air-fleet demonstrated the vulnerability of such large and frail machines when opposed by an organised defence of modern artillery and aeroplanes, and they ceased to be employed for such raids. They were, however, still of great value for naval reconnaissance, and it is said that it was owing to their assistance that the German fleet was enabled to escape at the battle of Jutland.

The British government had been energetically pushing forward the construction of a number of small airships of the 'S.S.' type, carrying 3 men, which were chiefly used as naval scouts for 'spotting' submarines and convoying merchant-ships. Larger vessels were also used, and towards the end of the war we possessed over 100 airships. Some large rigid airships of the Zeppelin type were also constructed in England, though not in time to take any active part in the hostilities. One of these, the R 34, starting on 4th July 1919 from East Fortune in Scotland, crossed the Atlantic, and landed on Long Island, New York, completing 3130 miles in 4½ days. After a stay of a couple of days, she started on the return journey, and arrived back in England in 3 days 3 hours.

Aeroplanes.—The history of the modern aeroplane may be traced back to the days of Sir George Cayley, early in the 19th century; but although his writings were sound and attracted some attention, not much was done to apply their principles. Later on, in 1843, Henson published details of a device which was practically what we now know as a monoplane. Wenham's paper to the Aeronautical Society in 1866 introducing superposed planes also created much interest. But though the writings and designs of these pioneers undoubtedly had their influence, it was not till Langley, in 1891, published the results of his experiments in aerodynamics that any real scientific interest in the subject was aroused. Meanwhile Ader had been at work in France experimenting with an actual machine, and with this, though no details were published at the time, he is said to have made more than one successful flight of short duration. In 1894–95 Maxim built his great aeroplane, with steam-engines developing 300 horse-power, and ran it along rails. Unfortunately, while running, the machine broke loose, and, after jumping through the air, fell, and was so badly wrecked as not to be worth repairing. In 1897 Langley's steam-driven model succeeded in travelling three-quarters of a mile through the air, a great triumph for a non-controlled machine. Meanwhile Lilienthal, in Germany, had been making a series of experiments with a glider, built up of canvas stretched on poles, and very similar in appearance to the outstretched wings of a bird. Resting his arms on the frame of this, he jumped off from the top of a hill and glided down through the air. He made some hundreds of such glides, and deduced many valuable data. Pilcher had also been at work in England with somewhat similar appliances. Unfortunately both these experimenters met with fatal accidents. Chanute, in America, had also been developing gliders, and the brothers Wilbur and Orville Wright continued the developments. Hitherto the great difficulty had been that no practical engine existed capable of developing sufficient power without prohibitive weight. The petrol internal-combustion engine was, however, now coming into general use, and a specially light model of this was eminently suitable for the purpose. In 1905 the Wrights applied such an engine to drive two large propellers on one of their biplane gliders, and a very marked success resulted, although nothing was published at the time to give the world any idea as to the great developments which were being carried on. In September they made flights up to 12 miles, and during October they succeeded in flying up to 24 miles, and remaining in the air for 30 minutes on end. In the following year, as rumours of the Wrights' doings got abroad, many investigators set to work, experimenting on a large scale. In France Archdeacon and Captain Ferber made flights with gliders; and on 13th September 1906 Santos-Dumont, in a curious cellular aeroplane with a long girder-tail in front, rose off the ground and flew for about 12 yards. Two months later he improved his flights, and remained in the air for 21 seconds. After a year of experiments Henry Farman came forward with a Voisin biplane, on which he flew for over 800 yards, and on 9th November completed a circular flight. He soon bettered the record, till on 6th July 1908 he remained in the air for 20 minutes. Léon Delagrange also made several flights on a similar machine, as did Blériot and Esnault Pelterie on monoplanes of their own construction. Meanwhile the Wrights had started experimenting again in America, and made some good flights, although still conducting them in secrecy. Then in July Wilbur Wright came over to France, and started making flights in public, and for the first time the mysterious Wright aeroplane was photographed and described. Day after day he flew, often for half-an-hour or more, and generally with a passenger. On 31st December he remained up for 2 hours and 19 minutes. Orville Wright was meanwhile demonstrating for the United States government at Fort Meyer, but on 17th September experienced a terrible accident, by which his passenger, Lieutenant Selfridge, was killed. M'Curdy, in Canada, made a number of good flights on several different machines; and Glenn Curtiss, in the United States, also flew on a biplane of his own design. Cody, at the military balloon school at Aldershot, made many more or less successful flights—the first in England. A. V. Roe also flew on a triplane. The 25th July 1909 must ever be a date to record, for on that day the Channel was first crossed by an aeroplane. This was a small monoplane steered by Louis Blériot, who started from near Calais, and landed at Dover, after a flight of 37 minutes. The first large public aviation meeting was held at Rheims on 22d to 29th August, and this was the occasion of opening the eyes of the public to

the marvellous strides that had been made in the practical navigation of the air by aeroplanes. A large number of machines were on the ground; though, it must be owned, the majority made but a poor show of flying. Nevertheless, the Blériots, the Farmans, the Antoinettes, as well as the Curtiss, made some very creditable performances. Farman remained in the air for 3 hours 4 minutes; Latham, on the Antoinette, made the record high flight, although that only amounted to 508 feet; while Curtiss won the Gordon Bennett prize for speed at 47 miles per hour. What was even more satisfactory was that there were no serious accidents during the meeting to mar the sport. However, on 7th September, Eugene Lefebvre, who had distinguished himself by his audacious flights at Rheims, met with a fatal accident at Juvissy; and only a fortnight later Captain Ferber, one of the most scientific pioneers of flight, was killed while landing in a Voisin machine. In October two aviation meetings were held in England, at Blackpool and at Doncaster, but nearly all the prizes were won by Frenchmen. In January 1910 L. Delagrange was killed while flying a monoplane near Bordeaux. In April took place an exciting competition for the prize of £10,000 which had been offered by the *Daily Mail* for a flight from London to Manchester. Mr Grahame White made a start, but a Frenchman, Louis Paulhan, succeeded in completing the course in two stages of 117 and 66 miles, and won the prize. On 2d June the Hon. C. S. Rolls, on a Wright biplane, flew across the Channel and back again to Dover. In July was held a great aviation meeting at Bournemouth, in which, unfortunately, there were several serious accidents, including one which resulted in the death of Mr Rolls. These unfortunate disasters seemed likely seriously to check the ardour of British airmen; but the dangers were soon forgotten, and a very successful meeting was held at Lanark two months later. At this several records were beaten, Drexel ascending to over 6000 feet, and Radley, on a Blériot monoplane, flying a mile at the rate of 76 miles an hour. It may here be remarked that speed records must ever be very dependent on the wind; even on a circular course a strong puff may make a considerable difference in increasing or retarding the speed. In November M. Tabuteau flew, on a Maurice-Farman biplane, for over 6 hours on end at Étampes, the distance being recorded at 290 miles. Also in this month the height record was beaten by Johnstone at New York, when he attained a height of 9714 feet. Records for distance flown, speed, and height attained were continually being improved upon during the next few years. In March 1912 Salmet flew from London to Paris and back. A month later the Channel was first crossed by a woman-pilot, Miss Quimby. The Irish Channel was also crossed; and in June of that year was held the first 'Aerial Derby' race round London. The War Office now began to recognise the great possibilities of aeroplanes for war purposes, and in 1912 offered some valuable prizes for competition. S. F. Cody won £5000 for an all-British machine, but was unfortunately killed shortly after by his machine falling. Wilbur Wright died of typhoid-fever in May, and many fatal accidents occurred to pioneers. In 1913 Pegoud created a great sensation by demonstrating the possibility of 'looping the loop' and flying upside-down. G. Hamel, who had accomplished many great flights, was lost in the Channel in May 1914. Legagneux attained over 20,000 feet, and Bohm, in Germany, remained in the air for over 24 hours. The Great War, commencing in 1914, resulted in enormous developments in flying. Although the first use of aeroplanes in war had occurred in the Mexican rebellion of 1911, and such machines were employed in the Balkan war shortly afterwards, these were but mere experiments. At the outbreak of hostilities there were but 272 government-owned aeroplanes in England, while the Germans were said to possess 470, and the French about 500. At the conclusion we had no less than 22,000 aeroplanes, and they were being constructed at the rate of 4000 a month. At first, though comparatively few machines were in use, and these of varied makes and efficiencies, they soon proved their great value for reconnaissance, directing artillery fire, and photographic survey. All combatants recognised their value, and soon the number of machines greatly increased, which resulted in numerous combats in the air. Throughout the war some 8000 enemy machines were shot down, with a loss to our side of 2800. Regular types for different uses developed. There were the scouts, the fighting-machines armed with machine-guns, and the bomb-droppers. Bombing raids were carried out for hundreds of miles over the enemy country. Aeroplanes not only engaged other machines, but attacked troops in the open with their machine-guns; while they were also used for supplying the front-line troops with ammunition and even with food. In January 1919 the height record was broken in England by two officers, who reached an elevation of 30,500 feet. Mr Hawker and Commander Grieve started in May to cross the Atlantic from Newfoundland, but were forced to come down when half-way across, and were rescued by a passing ship. Shortly after this three American seaplanes started to cross *viâ* the Azores, and one succeeded in reaching England in three stages. On 14th June Captain Alcock and Lieutenant Brown left St John's, Newfoundland, in a Vickers-Vimy aeroplane, and flew to Clifden, in Ireland, covering 1950 miles in 16 hours 12 minutes. But soon after this first crossing of the Atlantic in one flight, Sir J. Alcock was killed in a flying accident. In August 1919 a regular daily service between London and Paris for mails and passengers was first inaugurated. Leaving Hounslow on 12th November 1919, Captain Ross Smith, with his brother and two mechanics, flew, in a Vickers-Vimy aeroplane, from England to Australia, travelling a distance of over 11,000 miles in 28 days, and thus gained a prize of £10,000 offered by the Australian government. The machine was equipped with two Rolls-Royce engines of 350 h.p. Captain Kingsford-Smith and Mr Ulm crossed the Pacific from Oakland, Cal., to Brisbane in three stages, 31st May to 9th June 1928, a total flight of 7200 miles.

The Royal Flying Corps was organised in 1912, with a military and naval wing, but these were absorbed into the Royal Air Force in April 1918. See AIR FORCE.

Kites.—Although a device consisting of some sort of framework covered with paper or cloth, held by a long string, to be carried aloft by the wind, has been known for countless ages and in almost all countries, yet it seems remarkable that until quite lately it has hardly ever been applied to practical purposes. Passing by these mere toys, and the classical experiment of Franklin, who demonstrated by such means that lightning was the discharge of electricity, we come to the period since 1890, during which such appliances have been used for meteorological research, for photography, for signalling, advertising, and, finally, for carrying up men for military observation. Of those who have improved the kite into a useful instrument none deserve more credit than Laurence Hargrave, who in 1894, near Sydney, N.S.W., devised a 'cellular' kite, which developed into what is now known as a 'box' kite. The idea of sending up meteorological instruments on a kite

is not very new. D. Archibald made a series of observations in this way many years ago, but more recently a regular service was inaugurated at the Blue Hill meteorological observatory near Boston, and such observations have been regularly conducted in many parts of the world, notably by Dines in England, T. de Bort in France, and Professor A. Laurence Rotch in America. Such kites have been sent up to enormous heights. As regards man-lifting by kites, the idea has often been suggested, and even tried, but without much success, until Major Baden-Powell, in 1895, demonstrated their utility, using a kite 36 feet high to lift a man some few feet. Finding practical difficulties in using one big kite, he next strung together five or six of about 100 sq. ft. each, and by this means he frequently ascended to a height of 100 feet. On 18th September 1895 he gave the first public demonstration, before the British Association at Ipswich, and a number of trials of the apparatus were made at Aldershot. About this time Lieutenant Wise in America, and Mr Hargrave in Australia, also made some ascents on kites. Some years after Mr S. F. Cody devised a system of man-lifting kites, and these were adopted as the army pattern. Kite equipments were regularly used in the army, ascents being made on days when the wind was too strong for captive balloons. Men have on several occasions been up to a height of 3000 feet.

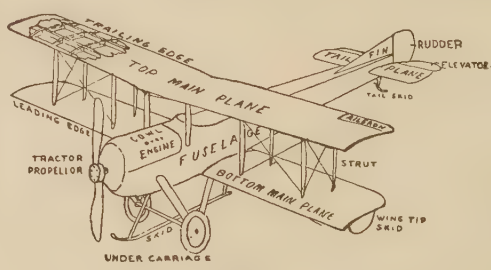
Parachutes.—Leonardo da Vinci both described and sketched a parachute, and several old illustrations are extant proving that a large surface of cloth with ropes depending from its edges had often been used in early times to enable a man to descend from a height, such as a tower, in safety. Such an appliance was first used from a balloon by Blanchard in 1785, but only to let down a dog. Garnerin, a few years later, was probably the first man to descend from a balloon, and he made many exhibitions of the feat both abroad and in England. In 1837 Cocking invented a new form of parachute, like an inverted cone, which he imagined would be steadier in its descent than the ordinary shape; but when released from a great height from Green's balloon over London, the machine collapsed, and the inventor was killed on the spot. In later times thrilling exhibitions have been given by Baldwin and many others. But it was not till the war, when captive balloons were so largely used for observation, and were so often attacked and set on fire, that the parachute became a recognised article of military equipment, and by its means many an aerial observer was able to save his life by jumping from a burning balloon. Parachute descents from aeroplanes travelling at high speed have also been successfully accomplished.

II. Descriptive.—Having thus recorded the chief events in the history of aeronautics, we may now describe shortly the various appliances in use.

Balloons.—The balloon is a nearly spherical bag, made of silk, or more usually of cloth, varnished or prepared with india-rubber, so as to render it gas-tight. The British military balloons, however, were for many years formed out of a number of layers of gold-beater's skin (the intestines of an ox), firmly cemented together. Over this envelope is spread a network of hempen cords, from which is suspended the basket-car to contain the passengers. At the top is a large wooden or metal valve, which is kept closed with springs, but which can be drawn open by means of a cord which hangs down through the middle of the balloon to the car. At the bottom the 'neck' is left open, so that the gas can escape when the pressure becomes great, as it does when the vessel has attained a height. Most balloons are now fitted with a 'ripping panel' and cord, so that on emergency, such as in landing in a strong wind, the envelope can be torn right down and immediately emptied of its gas. An anchor is provided to hold the balloon when landing, and a long 'guide-rope' is suspended below the car, so as to ease the descent and trail over the ground to facilitate the landing.

Airships are divided into three types—(*a*) *rigid*, in which there is a framework or skeleton, over which a skin is stretched, and within which a number of balloons are placed; (*b*) *semi-rigid*, in which the lower part only of the balloon is distended on a flat framework; and (*c*) *non-rigid*, when a gas-bag of elongated form has a long girder suspended below it. In the last two types the envelope is kept in shape by the gas being under pressure. This is effected by means of a 'ballonet,' or small balloon, placed inside the larger one, and blown out with air as tight as required. To prevent pitching, which was a difficulty with earlier machines, an 'empennage' of flat surfaces is usually arranged near the after-end. Of the first, or rigid, type the Zeppelins stand foremost. The first of these, built in 1898, was 400 feet long, with a capacity for lifting 11 tons, and was provided with two engines of 16 h.p., which could propel it at a rate of 17 miles per hour. The 1917 model had 60 tons of gross lift, with 1200 h.p. engines, and was capable of travelling 70 miles an hour through the air. Of British airships, the R 34, completed in 1919, is 639 feet long. The framework is of duralumin (an alloy of aluminium) of stream-line form (that is, fish-shaped, with pointed tail). Four cars or gondolas are slung beneath the keel, each containing an engine of 250 h.p., and one of them two such, so that the full engine-power is 1250 h.p., working four propellers. On the top of the vessel is an observation-platform. Of the semi-rigid type the Lebaudy vessels were the prototype, and several later machines are designed in a somewhat similar manner. The non-rigid type includes the small 'S.S.' machines, with a capacity of about 70,000 cubic ft. and an engine of 75 h.p.; also the larger 'Coastal' vessels, and the still bigger 'N.S.' type, of 360,000 cubic ft., with two engines each of 260 h.p.

Aeroplanes.—After the first invention of aeroplanes a number of different designs were introduced. The original Wright machine was of that class known as a *biplane* from having two planes arranged one above the other (which gives a strong girder structure). Each plane was 41 feet in span by 6½ feet 'chord'—that is, from front to rear. Fifteen feet in front was the elevator, consisting of two small superposed planes, while in rear two vertical rudders were placed. The *Farman biplane*



Biplane.

was much used in the early days. It had an elevator fixed out in front of the machine, and a box-tail in rear, the propeller being placed in rear of the planes. Flaps or 'ailerons' were arranged at the back of the outer ends of the planes for accomplishing the same objects as the Wrights' warping arrangement. The total surface was about 470 sq. ft., and it was usually driven by a Gnome

engine of 50 h.p. One other of the early machines is worth describing as having introduced several novelties. This is the *Blériot monoplane*. It had but a single pair of wings about 28 feet in span, which had to be stayed with numerous wires to struts above and below. There was a 'fuselage' like that of the modern machine, with elevator and rudder at its after-extremity. But a special feature was the tractor-screw mounted in front, which arrangement has been adopted in almost all aeroplanes of to-day. Experience gained during the war soon resulted in one type only becoming universal, and that is the biplane with fuselage and a tractor-screw (or screws) mounted in front. Engine-power has steadily increased from the 25 h.p. of the Wrights, the 50-h.p. 'Gnome,' and other engines of the first aviators, till now few machines have less than 80 or 100 h.p., and some of the very big machines (which are of the same general design) have four or even five engines each of 350 or 400 h.p. Such a machine can lift 15 tons, and 40 passengers have been carried in one. Speeds up to 300 miles per hour have been attained. The *seaplane* is like an ordinary aeroplane, but fitted with floats instead of wheels. In the *flying-boat* type the whole fuselage forms a boat to float on the water. Some of the larger machines are *triplanes*—that is, have three sets of wings, one above the other. Although all the older aeroplanes were built of wooden frames covered with varnished cloth, some of the later ones are constructed entirely of metal.

III. Theoretical Principles.—There are two main principles of constructing apparatus by means of which a body may be caused to rise and be maintained in mid-air. These are, by displacing a volume of air with a substance of lighter bulk, and, secondly, by causing an upward pressure of air on a surface driven through it.

Displacement.—Air at ordinary temperatures and pressure weighs about ·076 lb. per cubic ft. If, however, this air be warmed its volume will be increased, or, that is to say, an equal volume will be of less density. The volume may be taken to increase about one five-hundredth part for every degree Fahrenheit. Hence, if the air in a balloon be heated through 100°, one-fifth of the weight of air will be expelled. So, if the balloon has a capacity of 1000 cubic ft., 200 feet, weighing 15 lb., will be dispensed with, and a nearly equivalent weight can be raised in the air. Of substances lighter than air, the lightest of all is hydrogen, which weighs but ·005 lb. per cubic ft., so that a balloon of 1000 cubic ft. would lift about 70 lb. (In practice, the purity of the gas, the temperature, pressure, humidity, and other circumstances must be taken into account.) Helium, which has a lifting-power of 92 per cent. that of hydrogen, has recently been used for inflating airships, being uninflammable. It has been obtained in large quantities from natural gas in Canada and the United States. Coal-gas varies with the kind of coal and the temperature at which it is produced, but may be taken at about half the weight of ordinary air. Ammonia and steam have also been applied tentatively to ballooning.

Air-Pressure.—The theory of the support of bodies by the reaction of air pressing them upward against gravity is a more intricate subject to deal with. There are several ways in which this system may be applied, but the only one hitherto practically utilised is that of an inclined plane driven in a more or less horizontal direction, so that the air impinges on the inclined under-surface. This applies both to the typical aeroplane and to the pair of planes fixed together, and revolving around a common point which forms the lifting-screw or 'helicopter.' In order to arrive at the pressure which the air exerts on an inclined surface, we must first find what the pressure is on the surface when at right angles to the flow, and it is evident that that on the inclined surface will be proportional to the angle of inclination. Langley in 1891 published his *Experiments in Aerodynamics*, which changed many preconceived notions on the subject, and his conclusions have been corroborated by almost all subsequent experimenters. He showed that the pressure of the air in pounds per sq. ft. on a plane surface might be taken to be ·003 times the square of the velocity in miles per hour. Without quoting the many complicated formulæ which have been brought forward, we may give that of M. Eiffel, which has the advantage of extreme simplicity, and gives results very much in agreement with most of the recent authorities. It is that the pressure on a square inclined plane is equal to that on the plane at right angles, divided by one-thirtieth of the angle of inclination. What we are most concerned with is the pressure at very small angles of inclination, since the practical aeroplane acts at angles under 5° to the horizontal. Now the force acts normally or at right angles to the plane, and it may theoretically be considered as the combination of two forces—one acting vertically, and therefore in opposition to gravity; the other acting horizontally, opposing forward propulsion. Therefore, knowing the weight it is necessary to support, we may find the power necessary to apply to keep it up, or, knowing the thrust of the propellers, we may arrive at the weight it will sustain. These forces are known as 'lift' and 'drift' respectively. There are a great many points to be taken into consideration in calculating the actual lift of an aeroplane. First, what is called the 'aspect ratio'—that is, the proportion between the span from side to side and the length from front to back. This makes a considerable difference in the lifting-power. The after-part of the plane, receiving only the air which has already been diverted by the front part, is not so effective; hence the 'entering edge' is all-important. Then size has to be considered, for it has been shown that a large plane possesses a slightly greater lift in proportion to a small one. The profile has also a considerable influence on the result. If it is slightly curved so as to be concave underneath, or 'cambered,' the lift is increased. Moreover, experiment tends to show that if the upper side presents a larger curvature than the lower, especially if the greatest thickness be towards the front, greater efficiency results, and that the suction of the displacement of air above the plane is even more effective than the pressure underneath.

Ballot is a little ball used in the practice of secret voting, which is hence generally called 'voting by ballot,' whether it be a ball or a ticket that is used. Votes may be taken by ballot in various ways: the voter may deposit a ball in either of two boxes, so conjoined that no one shall be able to say into which he drops it; or he may be presented with two balls—a white and a black—and so drop one of them into a box that it shall be unknown which he used. Voting by ballot, the common form in ancient Greece and Rome, is now the general method at elections in countries where constitutional government prevails, and is usually carried out by means of marked (but unsigned) papers or cards. The ballot was one of the first things demanded by English reformers at the beginning of the 19th century; it stood in the original draft of the Reform Bill of 1832; but it was not till the passing of Mr Forster's Ballot Act in 1872 that secret voting was introduced at all parliamentary and municipal elections, except parliamentary elections for universities. It was used in Maryport for Town and Harbour Trusts elections from 1838.

Ballou, Hosea. See Universalists.

Ballycas'tle, a small seaport in the north of County Antrim, Ireland, on an open bay opposite Rathlin Isle, 68 miles N. of Belfast by rail. Its harbour and pier (now sanded up and ruined) cost £150,000. Coal was dug here 500 years ago. *Bally* represents the Irish *baile*, 'town.' Pop. (1926) 1984.

Ballymena, a small town of County Antrim, Ireland, on the Braid, 33 miles NNW. of Belfast by rail. It lies in a densely peopled and well-cultivated district, the inhabitants uniting the pursuit of agriculture with the manufacture of linen. Ballymena is a great linen and flax market, and its vicinity is covered with bleach-fields. Pop. (1926) 11,875.

Ballymoney, a market-town of County Antrim, Ireland, 53 miles NNW. of Belfast by rail, with a trade in linen; pop. (1926) 3161.

Ballymote, a town in County Sligo, 10 miles S. of Sligo; pop. 900.

Ballynahinch, a market-town of County Down, 12½ miles S. of Antrim; pop. 1700.

Ballyshannon, a seaport of County Donegal, the largest town of the county. It is at the mouth of the river Erne, on a small inlet running off from Donegal Bay, 157 miles NW. of Dublin by rail. There is a salmon-leap and a valuable salmon-fishery on the river. Pop. (1926) 2112.

Balm (*Melissa officinalis*), a fragrant perennial herb belonging to the Labiatæ, a native of the south of Europe and Western Asia, and naturalised in a few places in England, has long been cultivated in gardens. The stems and leaves are still occasionally used in medicine as a gentle stimulant and tonic, and were formerly in high repute. The taste is somewhat austere, and slightly aromatic. The quantity of essential oil, on which its whole qualities depend, is not more than sufficient to communicate a pleasant flavour to the infusion. — A variety of the common Cat-mint (*Nepeta Cataria*), with a smell like that of balm, is often mistaken for it. — Moldavian Balm (*Dracocephalum moldavicum*) is a native of Eastern Europe, Siberia, &c. — Bastard Balm (*Melittis Melissophyllum*), a native of the south of England and of many parts of Europe, is a very beautiful plant, which when dried has a delightful fragrance, and retains it long. *Calamintha nepeta* is sometimes called Field-balm, while *Collinsonia* is termed Horse-balm in America. Balm-like properties are extremely common among the Labiatæ (q.v.). The name is from the late Latin *balsamum*.

Common Balm (*Melissa officinalis*).

Balmain, a suburb of Sydney, Australia, with important iron-works and docks.

Balme, Col de, a mountain pass between Mont Blanc and the Dent du Midi, over which goes the route from Martigny to Chamonix. The summit is 7200 feet high.

Balmerino, a small village of Fife, on the Firth of Tay, 3½ miles SW. of Dundee by water. Near it are scanty remains of a Cistercian abbey (1227), whose lands came into the possession of Sir James Elphinstone, created Lord Balmerino in 1604. The sixth and last lord (1688–1746) was beheaded on Tower Hill for his share in the '45. See J. Campbell's *History of Balmerino* (Edin. 1867; new ed. 1899).

Balm of Gilead. See Balsam of Gilead.

Balmont, Constantine Dmitrievich, Russian poet, was born near Ivanovo-Voznesensk in the government of Vladimir in 1867, and is best known by his volumes of symbolist poetry, *Under Northern Skies* (1894), *Buildings on Fire* (1900), *Let Us be Like the Sun* (1903). He has also published translations and volumes of prose, and has travelled extensively.

Balmor'al, a royal residence in Braemar, Aberdeenshire, 9 miles W. of Ballater, and 52½ of Aberdeen. Standing 926 feet above sea-level on a natural platform that slopes gently down from the base of Craig-gowan (1437 feet) to the margin of the river Dee, it commands a magnificent prospect on every side. In 1848 Prince Albert acquired it on lease, and in 1852 purchased it outright. The old castle not being sufficiently commodious he erected a new one (1853–55) in the Scottish Baronial style. It consists of two separate blocks united by wings, with a massive tower surmounted by a turret. It is built of granite. The estate includes Birkhall, Knock Castle ruins, and Loch Muick; and extends to the summit of Byron's 'dark Lochnagar.'

Balnaves, Henry, of Halhill, Scottish Reformer, was born at Kirkcaldy in Fife of poor parents, but was educated at St Andrews University and at Cologne. He acted for some time as a procurator at St Andrews; in 1538 James V. made him a Lord of Session; and in 1543 the regent Arran appointed him secretary of state. Shortly after, however, he suffered a six-months' imprisonment in Blackness Castle on account of his Protestantism; and in 1546, like Knox, he joined Beaton's murderers in the castle of St Andrews. When the castle was captured by the French (1547), Balnaves, with Knox and others, was sent to Rouen as a prisoner of war. While in prison here, he wrote a treatise on Justification, which, with notes and a preface by Knox, was published in 1584 as *The Confession of Faith*. In 1556 Balnaves' forfeiture was rescinded, and he returned to Scotland, and took an active part on the side of the Lords of the Congregation. In 1563 he was nominated a commissioner to revise *The Book of Discipline*. He died in 1579.

Balrampur, headquarters of the estate of the premier talukdar of Oudh; pop. of town, 14,000.

Balsa. See Ochroma.

Balsam, a name formerly comprehending medicines compounded of resins and oils, as well as many resinous substances and oils, to which important medicinal virtues were ascribed. When the term balsam is now used without addition, the balsams of Peru and Tolu are generally intended. — These two balsams are very similar in all their more important properties, and are both produced by trees of the papilionaceous genus Myroxylon, natives of the tropical parts of America. *M. Pereiræ*, the source of balsam of Peru, is a tree found in the state of San Salvador, in the district called Balsam

Coast. *M. toluiferum*, a native of Venezuela, Ecuador, and Brazil, furnishes balsam of Tolu. After being bruised and charred, the bark of the former falls off, and balsam begins to exude. It is received on rags, which, when saturated, are boiled in water, the separated balsam falling to the bottom. It is a liquid, having the appearance of treacle, but rather less viscid. Balsam of Tolu is generally soft and tenacious when first imported, becoming hard by age. Both balsams have a very fragrant odour. They are used in confectionery, to impart a flavour like that of vanilla; also in perfumery, and for pastilles, &c. In medicine, they are administered as gentle stimulants and tonics, and particularly in chronic bronchial affections. *Tolu lozenges* are a popular and pleasant remedy for troublesome coughs. These balsams are also used for cleansing ulcers.—They contain cinnamic acid, and a peculiar oily substance which has been called *cinnameine*, and is also known as Oil of Balsam of Peru. The name *White Balsam of Peru* is sometimes given to a balsamic substance which flows from the *Liquidambar styraciflua*. See LIQUIDAMBAR.

Balsam is also the common name of a genus of succulent herbaceous plants, of which the beautiful balsam (*Impatiens Balsamina*), much cultivated in gardens and greenhouses, is a familiar example. They are natives chiefly of damp bushy places in the East Indies, and many of them plants of great beauty. They are almost all annuals, and have generally white or red flowers. Impatiens is the chief genus of Balsaminaceæ, distinguished from Geraniaceæ by the extreme irregularity of the flowers, which have been the subject of much controversy among morphologists, and also by the beakless fruit, which is a five-celled capsule, bursting by five elastic valves. The leaves are simple, and without stipules, the flowers generally axillary. The common balsam is a native of the East Indies and Japan. Many fine varieties, double as well as single, and of all varieties of colour and marking, have resulted from careful cultivation, and florists distinguish pyramidal, dwarf, and camellia-flowered races. It has an upright succulent stem, usually about 1–2 feet high, but in favourable circumstances will attain a greater size. In Britain, the seed is usually sown on a slight hotbed, and the plant is often kept in the greenhouse; although even in Scotland it may be made an ornament of a sheltered border. It is one of the flowers frequently to be seen in cottage-windows. One species of balsam (*Impatiens Noli-tangere*), called Yellow Balsam or Touch-me-not, is a native of Europe, and a doubtful native of Britain. It has yellow flowers, and one of the petals prolonged into a spur. Its ripe capsules burst on the slightest touch, scattering the seed. *I. parviflora*, from Russia, has become naturalised in southern England. In Saxony it has become a terrible weed, crowding out the indigenous flora in many places.

Balsam (*Impatiens scabrida*).

Balsam Bog. See AZORELLA.

Balsam or **Balm of Gilead** is a liquid resinous substance, which has long enjoyed a very high reputation in the East for its fragrance and medicinal virtues. It is the subject of several allusions in the Old Testament, and is celebrated by Strabo, Pliny, Diodorus Siculus, and other ancient writers, almost as a cure for every disease. It is generally believed to be derived from a species of Balsamodendron (q.v.). The finest balsam, called Opobalsam, or Balm of Mecca, is of a golden yellow colour, and of a consistence like honey. Balm of Gilead is irritating when applied to the skin. Other substances sometimes designated balsams, and possessing a somewhat similar fragrance, are produced by different species of the same family. Among them is one called American Balm of Gilead, the produce of a tree called *Protium Carana*.—Balsamic substances are furnished also by a number of species of Clusiaceæ. —Balsam of Umiri, a fragrant yellow fluid, comes from *Humiria floribunda*, a South American tree, of the Humiriaceæ (akin to Linaceæ).—Canada Balsam (q.v.) is a kind of turpentine got from the Balm of Gilead Fir (*Abies balsamea*); Hungarian Balsam, from the Mugho or Mountain Pine (*Pinus pumilio* or *Mughus*); and Carpathian Balsam, from the Stone Pine (*Pinus Cembra*). See FIR and PINE.—Balsam of Copaiva (q.v.) is the produce of different species of Copaifera. See EMBALMING.

Balsamoden'dron, or COMMIPHORA, a genus of small trees or bushes of the Burseraceæ. Some of them are spiny; they generally exhibit a scrubby appearance, and have little foliage, but are remarkable for the resins or balsams obtained from their wood and fruit—as Balsam of Gilead, Myrrh, Bdellium, and Elemi (see these articles). The known species are mostly natives of the East Indies, Arabia, and the east of Africa.

Balta, a town on the Kodema, an affluent of the Bug, capital of the Moldavian autonomous republic in Ukraine. Tallow-melting, soap-boiling, and brewing are carried on. Pop. 19,000.

Baltchik. See BALTJIK.

Baltic, BATTLE OF THE. See COPENHAGEN.

Baltic Languages, a branch of the Indo-Germanic family of languages akin to Slavonic. It includes Lettish, Lithuanian, and the extinct Old Prussian. See PHILOLOGY, p. 99.

Baltic Port, a seaport and railway terminus of north-west Esthonia.

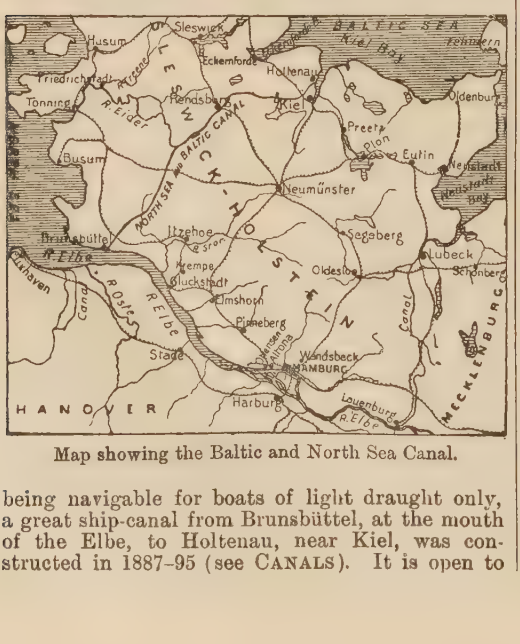
Baltic Provinces, now States, include the former Russian governments of Courland, Livonia, and Esthonia; in a wider sense also Finland and the Russian government of Petrograd. The Baltic provinces once belonged to Sweden, except Courland, a dependency of Poland. They came into the possession of Russia partly through the conquests of Peter the Great, partly under Alexander in 1809. No pains were spared to Russianise them, and after 1876–77 they lost their remaining privileges, and were thoroughly incorporated in the Russian empire. They form a borderland between the Germanic and Slavonic areas, and have been a frequent cause of difficulty between Germany and Russia. The bulk of the people are Esths and Letts, with many Germans, but few Russians. After the Russian revolution of 1917, the independent republics of Finland, Esthonia, and Latvia, or Lettland (southern Livonia, Courland, and western Pskov), were set up. See also LITHUANIA.

Baltic Sea, bordered by Denmark, Germany, Poland, Lithuania, Lettland, Esthonia, Russia, Finland, and Sweden, communicates with the Kattegat

and North Sea by the Sound and the Great and Little Belts. Its length is from 850 to 900 miles; breadth, from 100 to 200; and area, including the Gulfs of Bothnia and Finland, 184,496 sq. m., of which 12,753 are occupied by islands. Its mean depth is 36 fathoms, and the greatest ascertained depth, between Gottland and Courland, 216. Its shallowness and narrowness, its numerous islands and reefs, the shoal coasts of Prussia on the one side, and the rocky coasts of Sweden on the other, and above all, the numerous and sudden changes of wind accompanied by violent storms, make the navigation of the Baltic very dangerous. The group of the Åland Islands divides the south part of the sea from the north part or Gulf of Bothnia (q.v.). The Gulf of Finland (q.v.), branching off eastwards, separates Finland from Esthonia. A third gulf is that of Riga or Livonia. The Kurisch and other Haffs (q.v.) are not gulfs, but fresh-water lakes at the mouths of rivers.

The water of the Baltic is colder and clearer than that of the ocean, and contains only a fourth of the proportion of salt found in the Atlantic. Ice hinders the navigation of the Baltic from three to five months yearly. Rarely, as in 1658 and 1809, the whole surface is frozen over. Tides, as in all inland seas, are little perceptible—at Copenhagen, about a foot; yet the water rises and falls at times, though from other causes, chiefly from the varying quantity of water in the rivers at different seasons. Upwards of 250 rivers flow into this sea, which, through them and its lakes, drains rather less than one-fifth of all Europe, its drainage area being estimated by Dr W. B. Carpenter as 717,000 sq. m. The chief of these rivers are the Oder, Vistula, Niemen, Dwina, Narva, Neva, Motala. The principal islands east of the group that blocks the entrance, are Bornholm, belonging to Denmark; Gottland and Öland, to Sweden; Rügen, to Prussia; Dagö and Ösel to Esthonia; and the Åland Islands (Swedish in population), to Finland. Timber, hides, tallow, and grain are the chief exports from the countries bordering on the Baltic. The number of vessels that pass the Sound to or from the Baltic annually is very large. See SOUND.

The Eider Canal, connecting the Baltic near Kiel with the North Sea at Tönning, facilitated the grain trade in mild winters; and the two seas are also connected by the Gotha Canal, which joins the lakes of South Sweden. These



Map showing the Baltic and North Sea Canal.

being navigable for boats of light draught only, a great ship-canal from Brunsbüttel, at the mouth of the Elbe, to Holtenau, near Kiel, was constructed in 1887–95 (see CANALS). It is open to all nations alike. Harbours in the Baltic are: in Denmark, Copenhagen; in Germany, Kiel, Lübeck, Stralsund, Stettin, Königsberg, with Danzig under the League of Nations, and Memel in Lithuanian hands; in Latvia, Libau and Riga; in Esthonia, Reval and Narva; in Russia, Kronstadt; in Finland, Helsingfors; and in Sweden, Stockholm and Karlskrona.—The shores of Prussia and Courland have been long noted for the amber cast ashore in stormy weather. Another important phenomenon connected with the Baltic is a slow vertical movement of its coasts, *downwards* in the south of Sweden, but farther north *upwards*, being there supposed to be at the rate of 3 feet in a century. Its area is held to be gradually decreasing. The Germans call this sea *Ostsee*, or East Sea; the name Baltic first appears in the 11th century, in a work by Adam of Bremen.

Baltimore, named after the first Lord Baltimore (q.v.), is a port of entry and the largest city of Maryland. The eighth city of the United States in population, it stands on the northern bank of the river Patapsco, an arm of Chesapeake Bay, 180 miles by ship-channel from the ocean, 96 miles SW. of Philadelphia, and 40 NE. of Washington. Its site is uneven, and its surroundings are picturesque and pleasant. The plan of the streets is not so strictly uniform as in many American cities. The harbour is spacious and perfectly secure, having a minimum depth of 24 feet, and access from the sea is safe and easy. Baltimore is reached by numerous lines of railway connecting in a Grand Union Depôt, and having several other stations in various parts of the city. It is an important centre of the traffic in bread-stuffs, which are largely received by rail and shipped at this point. Other leading articles of export are tobacco, provisions, live stock, cotton, oil, lumber, canned fruits, and oysters. The imports include large amounts of coffee and other tropical products, fruits, fertilisers, iron, steel, tin-plate, and chemicals. Baltimore is also the seat of extensive and varied manufactures, including cotton and woollen goods; flour of superior quality, largely produced in Baltimore and vicinity; tobacco and cigars; glassware; boots and shoes; iron and steel, including machinery, car-wheels, iron bridges, stoves, furnaces, &c.; clothing, in the manufacture of which large capital is invested; pianos, organs, &c. One of the principal industries of Baltimore is the canning of oysters, in which many hands are employed during the annual oyster season—several thousand vessels being engaged in the oyster-fishery. The canning of fruits and vegetables is also a large industry. Textiles rank high, most of the duck goods in the United States being produced there. Baltimore is the largest corn-exporting port in the country, and has also a large jobbing trade. In the first half of the 19th century the famous 'Baltimore clippers' greatly extended the trade of the city.

Baltimore is noted for the fine architecture of its public and other buildings, among the finest being the chamber of commerce, the Roman Catholic cathedral, the Maryland Institute, the city hall (with a dome 260 feet high), the beautiful white marble court-house, the masonic temple, the Peabody Institute (see PEABODY), and the Memorial Hall commemorating the Great War. The public monuments, of which five or more are noteworthy (the Washington column being 210 feet high), have given Baltimore the name of the 'monumental city.' There are several public squares and parks, the beautiful Druid Hill Park, of nearly 700 acres, being the most celebrated. There are numerous churches, among which the Roman Catholic, the Protestant Episcopal, and the Methodist denominations are conspicuous. The

educational institutions are many and important. The Johns Hopkins University, endowed with over $3,500,000 by a Quaker philanthropist of that name (1795–1873), was opened in 1876, and at once took rank as one of the first seats of learning in the country. Among other institutions are the University of Maryland (partly situated in College Park, Maryland), Goucher College (formerly the Woman's College of Baltimore), a dental school (the oldest in the world), Loyola College, St Mary's Seminary, scientific, legal, and technical colleges, various institutes for white and coloured; and there are complete systems of graded public and parochial schools. The city has a number of good libraries, of which the largest are the Enoch Pratt Free Library and the library of the Peabody Institute.

Baltimore is a place of much wealth and social refinement, and is noted as an art-centre. It is the seat of a Roman Catholic archbishop, who has the rank of primate of the United States, the see being the oldest in the country. The diocese of Baltimore was created in 1789; and the see became archiepiscopal in 1808. Dr John Carroll was the first bishop and archbishop. Owing to the fact that Maryland was originally settled to a great extent by members of the Roman Catholic Church (chiefly of English birth), that church and its adherents have always had a greater social influence in Baltimore than in most American cities of its size. Baltimore is also the seat of a bishop of the Protestant Episcopal Church. The population of the city is of various origin. About one-seventh of the people in 1920 were of African descent, and about one-sixth were of foreign birth. Among the native-born population of the city there is a large element of German descent, and many Irish and French creole families were among the earlier settlers. In colonial days, the English Puritans, and later, the Scotch-Irish Presbyterians, were here numerous. Of the present inhabitants, a considerable proportion have been born in states lying farther north than Maryland.

Founded in 1729, the city was named in honour of Lord Baltimore, the founder of the Maryland colony, and in 1796 was incorporated as a city. It very early became noted for its commerce and ship-building. It was the scene of important events during the war of 1812–15, and in the early part of the Civil War of 1861–65, and of a destructive conflagration in 1904, which spread through the business centre of the city. Pop. (1790) 13,503; (1830) 80,625; (1860) 212,218; (1880) 332,313; (1910) 558,485; (1920) 733,826.

Baltimore is a small fishing-village in County Cork, on Baltimore Bay, 7 miles SW. of Skibbereen. Here was established in 1887, by the Baroness Burdett-Coutts, a technical school for giving instruction in all that pertains to fishing, sail-making, net-making, &c.

Baltimore, GEORGE CALVERT, first LORD, born at Kipling, in Yorkshire, about 1580, entered parliament in 1609, was knighted in 1617, and in 1619 became Secretary of State. In 1625 he declared himself a Catholic, and resigning his office, received the rank of Baron Baltimore in the Irish peerage. His Irish estates were at the same time confirmed to him, and thither he retired. As early as 1621, Calvert had despatched colonists to a small settlement in Newfoundland, and in 1627 he visited the place. In the following spring he returned with his family, and stayed till the autumn of 1629. The severe winter induced him to sail southward in search of a more genial country; but his attempts to settle in Virginia led to disputes, and he returned home to obtain a fresh charter. He died, April 15, 1632, before the completion of the patent, which was granted in June to his son, Cecil, second Lord Baltimore. See MARYLAND, and Life by Neill (Balt. 1869).

Baltimore Bird or **Oriole** (*Icterus Baltimorii*), a finch-like perching bird, very common in North America from Canada to Mexico. The males arrive from the south about the beginning of May, and are soon followed by the females. They settle near houses on tulip-trees, pea-vines, and the like, and build a beautiful hanging nest of skilfully interwoven moss and fibres. The name 'hang-nest' obviously refers to this habit. They levy contributions from any loose soft material that may come handy, such as the hairs of horses and cattle, the thread laid out for bleaching, or the strings wound round the fruit-tree grafts. The

Baltimore Oriole.

pendulous pouch measures 6 or 7 inches in length, and varies somewhat according to the climate. The bird itself is somewhat smaller than a starling, measuring about 7 inches in length, with sharp conical bill longer than the head, long pointed wings, and medium-sized rounded tail. The plumage is very gay, especially in the males, glossy black, finely contrasting with bright orange and vermilion. Orange and black were the colours of Lord Baltimore's livery, hence the name Baltimore Bird. Another of its many aliases, 'fire-bird,' describes its bright flashing appearance among the branches. The song is powerful and pleasing, and is peculiarly mellow during the love-season. These birds are gregarious, and while they do some damage by plundering pea-pods and other fruits, more than compensate for their thefts by their destruction of orchard insects like the cankerworm and tent-caterpillars. They are quick and lively in their habits, and make courageous parents. The genus Icterus must be distinguished from the true Orioles (q.v.). See Baird, Brewer, and Ridgway, *North-American Birds.*

Baltistan, or LITTLE TIBET, is an alpine region through which the Upper Indus flows. It lies below the Kara-Korum Mountains and the Himalayas, with a mean elevation of 11,000 feet, and contains Mt. Godwin-Austen (K^2), 28,278 feet high, next to Everest the highest on the globe. It is politically a part of Kashmir, and the inhabitants are of Mongolian stock.

Baltjik', or BALCIC, a seaport of Rumania, on the shore of the Black Sea, 20 miles NE. of Varna. Near it are the ruins of Tomi, whither Ovid was exiled. It was ceded by Bulgaria in 1913. Pop. 7000.

Baluchistan. See BELUCHISTÁN.

Baluchitherium, a gigantic fossil Rhinoceros (q.v.).

Balzac, HONORÉ DE, was born at Tours on the 20th May 1799. He was educated at the Collège de Vendôme and studied law at the Sorbonne. In opposition to his father's wish that he should become a notary, he left Tours in 1819 to seek his fortune as an author in Paris. From 1819 to 1830 he led a life of frequent privation and incessant industry, producing stories which neither found nor deserved to find readers, and incurring—mainly through unlucky business speculations—a heavy burden of debt, which harassed him to the end of his career. He first tasted success in his thirtieth year on the publication of *Les Derniers Chouans*, which was soon afterwards followed by *La Peau de Chagrin*, a marvellous interweaving of the supernatural into modern life, and the earliest of his great works. After writing several other novels, he formed the design of presenting in the *Comédie Humaine* a complete picture of modern civilisation. All ranks, professions, arts, trades, all phases of manners in town and country, were to be represented in his imaginary system of things. In attempting to carry out this impossible design, he produced what is almost in itself a literature. The stories composing the *Comédie Humaine* are classified as 'Scènes de la Vie Privée, de la Vie Parisienne, de la Vie Politique, de la Vie Militaire,' &c. They are connected by a web of intrigue which has the Paris of the Restoration for its centre, but which stretches its threads over the provinces. Each of the actors in the brilliant crowded drama is minutely described and clothed with individuality, while the scenes in which they move are set forth with a picturesqueness and verisimilitude hardly to be matched in fiction. Among the masterpieces which form part of Balzac's vast scheme may be mentioned *La Recherche de l'Absolu*, *Le Père Goriot*, *Les Illusions Perdues*, *Les Paysans*, *Les Marana*, *La Femme de trente Ans*, *Les Parents Pauvres*, and *Eugénie Grandet*. The *Contes Drôlatiques* (1833) stand by themselves. They are a series of gross stories in the vein of Rabelais, Balzac reproducing with masterly skill the French of the 16th century. Balzac's industry was amazing; according to his own account, he not infrequently worked for fifteen and even eighteen hours a day. He wrote eighty-five novels in twenty years, though he was not a ready writer; and though he was no 'stylist' in the sense that Flaubert was to a typical extent, he expended enormous labour on his proof-sheets. His work did not bring him wealth; his yearly income, even when he was at the height of his fame, is said to have rarely exceeded 12,000 francs. During his later years he lived principally in his villa, Les Jardies, at Sèvres. In 1849, when his health had broken down, he travelled to Poland to visit Madame Hanska, a rich Polish lady, with whom he had corresponded for more than fifteen years. In 1850 she became his wife, and three months after the marriage, in August of the same year, Balzac died at Paris. His influence on literature has been deep and many-sided, and novelists with so little in common as Feuillet and Zola alike claim him for their master. He studied character and the machinery of society in a scientific spirit, but he was not content with the photographic reproduction of fact. He was a visionary as well as an analyst, an idealist and a realist in one. The materials acquired by study were shaped and coloured by his fiery and teeming imagination. In the *Comédie Humaine* we see the everyday world reflected in a magic mirror, where the lights are brighter, the shadows darker; where objects stand out in sharper relief, and are sometimes oddly distorted. He strenuously exaggerates in the delineation of character. 'Every one in Balzac,' says Baudelaire, 'down to the very scullions, has genius.' His work bears trace of the strain with which it was produced; it is often coarse, often extravagant, occasionally dull. But few writers give such an impression of intellectual force.

His works were published in 25 vols. (1869–75); with a supplemental *Histoire des Œuvres*, by Lovenjoul (1879), who wrote *Autour de Balzac* in 1897. In 1912 an edition of the *Œuvres Complètes* in 40 vols. began to appear. See also the Life by his sister (1858); Le Breton, *Balzac, l'Homme et l'Œuvre* (1905); Brunetière, *Honoré de Balzac* (trans. 1907); books by Wedmore (1890), Miss Wormeley (1892), Sandars (1905), Lawton (1910), Faguet (1913), Curtius (1923); Saintsbury's Preface to the translation of *La Peau de Chagrin* (1895), and Henry James's to *The Two Brides*. He was described as a 'fat man, short and vulgar;' neither warm-hearted nor sympathetic, but of enormous vitality. Turgenieff found him so unsympathetic as to be unreadable. The 'de' in his name was factitious; his father's father was a day-labourer in Languedoc.

Balzac, JEAN LOUIS GUEZ DE, born at Angoulême in 1594, in his youth was secretary to Cardinal la Valette at Rome, and on his return to Paris devoted himself to the refinement of his native language. His writings heralded the splendid phalanx of genius which adorned the subsequent age of Louis XIV. He was a favourite of Cardinal Richelieu, a member of the French Academy, a councillor of state, and historiographer. His violent literary disputes with Father Goula caused him to leave Paris and retire to his hereditary property of Balzac, where he died on the 18th February 1654. His collected works were edited by the Abbé Cassaigne (1665); selections, by Malitourne (1822), and Moreau (1854). Of all his works, his *Lettres* (1806) and *Lettres Inédites* (1874) are most admired.

Bamako, or BAMMAKO, capital of French Sudan, on the Niger and the railway from Dakar to Koulikoro. Pop. 16,000.

Bambarra, one of the former Sudan states of Western Africa, lying on both sides of the Upper Niger. In the east, the country is flat and swampy; but in the west there are low chains of granite hills. The climate in some parts is intensely hot, but is generally healthy. The land is well watered and fertile. The inhabitants, a branch of the Mandingoes, are superior to their neighbours in intelligence. The principal towns are Bamako (q.v.), Sego, Sansanding. Many local merchants are very wealthy, and a pretty extensive trade is carried on, the natives working articles in gold, ivory, and iron. In 1899 it was incorporated with the French Sudan, called till 1920 Upper Senegal-Niger.

Bamberg, a Bavarian city, in Upper Franconia, beautifully situated on the banks of the Regnitz, 3 miles above its confluence with the Main, and 33 N. of Nürnberg by rail. Set in the midst of vineyards, orchards, and hop-gardens, and founded about 769, from 1007 to 1802 it was the seat of independent prince-bishops. The most noteworthy of its many churches is the cathedral, a magnificent edifice in the Romanesque style, founded by the Emperor Henry II. in 1004, and thoroughly restored in 1828–37. It has five towers, and contains, among other monuments, the elaborately carved tomb of the founder and his empress, Kunigund. There are several other fine ecclesiastical structures of early date, and opposite the cathedral is the palace (1702) of the former prince-bishops, from one of whose windows Marshal Berthier (q.v.) met his death. St Michael's Benedictine abbey (1009) was in 1803 converted into an almshouse. The ruins

of the castle of Altenburg, originally the seat of the Counts of Babenberg, stand on an eminence 1¼ miles from the town. Pop. (1925) 50,152. The beer is famous; cottons and woollens are manufactured, also electrical articles, leather, gloves, tobacco, sugar, and ropes.

Bamberger, LUDWIG (1823–99), born at Mainz of Jewish parentage and bred a lawyer, was a revolutionary in 1849, and after 1870 was a conspicuous representative in the Reichstag of the National Liberal and Free-trade Party. He opposed Bismarck and the government colonial policy.

Bambi'no (Ital., 'babe'), a term in art descriptive of the swaddled figure of the infant Saviour. The *Santissimo Bambino*, in the church of the Ara Cœli at Rome, is held in great veneration for its supposed miraculous power of curing the sick. It is carved in wood, painted, and richly decorated with jewels and precious stones.

Bamboo, a group of grasses (*Bambusa*, &c.), of which most of the species attain a great size, many of them 20 or 30 feet, some 70 or 100 feet in height. The species are numerous, and are found in tropical and subtropical regions, both of the eastern and western hemispheres. Some of the species grow to the height of only a few feet; and almost all of them are slender in proportion to their height, although *Guadua angustifolia* has often a trunk 16 inches in diameter. All of them have a jointed subterranean root-stock, which throws

Arundinaria falcata:
a, upper portion of the stem, with foliage; *b*, root-stem; *c*, section of stem.

up 10–100 stems. These are generally straight and erect; although one large species (*B. agrestis*), common in dry mountainous situations in the south-east of Asia, has crooked, and sometimes creeping stems. The stems grow to their full height unbranched, but afterwards throw out straight horizontal branches, especially in their upper parts, forming a dense thicket; some of the smaller kinds are often planted as hedges. The stems are jointed like those of other grasses, very hard, but light, elastic, and hollow, containing only a light spongy pith, except at the joints or nodes, where they are divided by strong partitions. The stems of different species vary also very much in the thickness of the woody part, and so in their adaptation to different purposes. In China and Japan is found a bamboo the stem of which, instead of being cylindrical like that of other bamboos and all grasses, is square. At three years old, this stem is one inch in section each way (see *Nature*, vol. xxxii.). The *hairy* bamboo is one of the most useful in China. The external covering of the stem is, in all the species, remarkably siliceous; the stem of *B. tabacaria* is so hard that it strikes fire when the hatchet is applied. There is perhaps scarcely any plant that serves such a variety of domestic and economical purposes. It would be difficult to point out an object in which strength and elasticity are required, and for which lightness is no objection, to which the stems of the different species are not applied. In the whole of the East, particularly in India, China, and Japan, in Jamaica and other parts of the West Indies, and some parts of South America, it forms almost the sole material of which the houses of the poor are built. It is employed for water-pipes, for which purpose its hollow stems (after the partitions at the joints are removed) render it eminently well fitted. It is used in the building of bridges, in the manufacture of furniture, ladders, masts for boats, rails, fences, spear-shafts, domestic utensils, and agricultural implements. The stems are also split up finely and worked into mats, and ropes, and even into the sails of boats. From both the external and internal pellicles of the stems an excellent paper is made by bruising and steeping it in water till it becomes a paste. Large quantities of bamboo cane are imported to Europe for various purposes, such as the making of walking-sticks, stakes for flowers and the training of fruit-trees in nurseries, and the manufacture of wicker-work. The leaves of some kinds are used as thatch in the making of hats and mats; those mats seen enfolding chests of tea being made of the leaves of one species cultivated by the Chinese for that purpose. The shoots, when young and tender, are eaten in the same way as asparagus, or boiled with milk, or made into broth with the addition of animal food, spices, and salt; also along with the young root-stocks they are pickled in vinegar wherever they abound in the East, and are imported into Europe as an eastern condiment under the name *Achiar* or *Achar*. The pith of some species is sugary, and at certain seasons a saccharine juice exudes from it at the joints, which becomes concrete on exposure to sun and air, and is used for domestic and economic purposes in India. This substance is called *Indian Honey*, and is erroneously also sometimes named *Tabaris* or *Tabasheer*, a name which properly belongs to another and very remarkable substance produced in the hollow internodes of the stems of some of the species (see TABASHEER). The seeds of some species are used as rice, and for making a kind of beer. Some species, however, only flower at very long intervals, and that simultaneously over wide areas. Thus *Phyllostachys Henonis* is believed to flower in Japan once in 120 (or sometimes 60) years, independently of varying local conditions. Bamboos are generally of very rapid growth, and they are often found in arid situations, which would otherwise be destitute of vegetation. *G. angustifolia* and *B. latifolia*, both natives of South America, have the internodes of the stems filled with clear fluid of an agreeable taste, which, though containing slight traces of sulphates and chlorides, can scarcely be distinguished from pure spring-water. It is not improbable that they may yet be

employed, where they do not naturally abound, to render districts productive which are now little else than deserts, in climates like those of Arabia, the north of Africa, and Australia; and the quality of the grain of different species seems to deserve more attention than it has yet received. The species common in the West Indies (*B. vulgaris*) is supposed to have been introduced from the East Indies. A few species are found in the Himalaya, to an altitude of 12,000 feet, and a dwarf species from that region has been successfully tried in the open air in England. See JUNGLE.

Bambouk, or BAMBUK, a country of French Sudan, lying in the angle formed by the Senegal and Faleme rivers. The climate is unhealthy, especially during the rainy season; but the valleys are remarkable for their fertility. Trees common to Western Africa here attain enormous proportions. Bambouk has rich iron ore and deposits of gold in its rivers, especially the Faleme. Faranaba and Mandinka are the chief towns. The inhabitants, the Mandingoes, are professedly Mohammedans, but they cling to many pagan superstitions, and are very ferocious.

Bamburgh, the site of an ancient fortress on the coast of Northumberland, 5 miles E. of Belford, and 16½ SE. of Berwick. It crowns a basaltic rock 150 feet high, and accessible only on the SE. side. The best authorities agree that it was founded about 547 by Ida, first king of Bernicia, and later named *Bebbanburh*, after Bebbe, the queen of Æthelfrith, his grandson. In 642 it was unsuccessfully besieged by Penda, the heathen king of Mercia; and during the Danish descents on England it twice was partly demolished. Robert de Moubray, the rebellious Earl of Northumberland, having fallen into the hands of William Rufus in 1095, his countess surrendered the stronghold under the threat of seeing his eyes seared out. When Northumberland was granted to Henry, son of David I. of Scotland, Bamburgh Castle was reserved for the English crown, and here Baliol acknowledged Edward I.'s supremacy in 1296. During the Wars of the Roses it was the scene of several conflicts, and was so battered and destroyed that it has not again been used as a fortress. In the reign of Elizabeth, its governor was Sir John Forster, and it continued in his family till Tom Forster forfeited it for his share in the '15, as is finely told in Besant's romance. Lord Crewe, Bishop of Durham, then bought it, with the Forster estates, and bequeathed it in 1721 to trustees for benevolent purposes. The restoration of the castle, and its conversion to charitable uses, were chiefly carried out by the Rev. Dr John Sharpe; its income (about £9000) being expended in providing a dispensary; funds for maintaining, educating, and starting in life poor children; appliances for the rescue of shipwrecked sailors; the repair of churches; and aiding young men at the universities. In 1894 it was purchased from the trustees by Lord Armstrong, and endowed as an almshouse. Bamburgh village, near the castle, was a royal borough before the Conquest, and in the time of Edward I. returned two members to parliament. Grace Darling (q.v.) is buried in the churchyard. See Freeman's *English Towns and Districts* (1883); and vol. i. of the *History of Northumberland* (1893).

Bámián is a mountain-valley in Afghanistan, on the chief road between Kabul and Turkestan, and near the northern base of the Koh-i-baba range (see map at AFGHANISTAN). The valley itself lies 8500 feet above sea-level. The stream that drains it ultimately finds its way to the Oxus. The inhabitants are Hazáras. The most notable feature of the district is a number of human figures of enormous size carved in the conglomerate rocks, from 200 to 300 feet high, which form the northern side of the valley. Of these there are five in all; and the

The largest of the Figures at Bamian.

two principal were described by the Chinese Buddhist monk, Hwen Thsang, who visited the valley about 630 A.D. By recent careful measurement, it appears that the largest is 173 feet high, or 3 feet higher than the Nelson Monument in Trafalgar Square; the second is 120 feet; the others are about 50 and 30 feet. The figures are solidly carved in niches in the rock, but the drapery and finishing are in stucco; and they have been much damaged by cannon shot, said to be those of the army of Nadir Shah. The two larger figures are usually regarded as male and female; but it is certain that Hwen Thsang was right in regarding them both as figures of Buddha; in the Chinese traveller's time there was a large Buddhist settlement here, with 10 convents and 1000 monks, and Bamian was a 'royal city.' That the figures are the work of Buddhist artists from India seems almost certain from their style of art, as also from the pictures with which the niches in which they stand have been covered. Stairs cut in the rock enable visitors to climb to the head of the figures. About two miles east of Bamian there seems to have existed a stupendous recumbent figure '1000 feet in length,' representing Buddha entering Nirvana (see BUDDHISM); as modern travellers do not mention it, it was probably composed of rubble plastered over, and so has disappeared.

The rocks are further full of caves. They have curious domed roofs, and are covered with pictures in the same style of art as the niches containing the statues. The caves are dug out of the rock at various heights. The city, whose ruined walls and towers stand on the rock of Ghulgule, was besieged and taken by Jenghiz Khan, and the inhabitants wiped out. There is now no town of Bamian, but there are a few small villages scattered up and down the valley. See an article in the *Journal of the Royal Asiatic Society* (1886) by Captain Talbot, with notes and sketches by Captain Maitland.

Bammako. See BAMAKO.

Bampton Lectures, a series so called after the name of their founder, the Rev. John Bampton, a minor canon of Salisbury, who at his death in 1751 left £120 per annum to the university of Oxford, for the endowment of eight divinity-lecture sermons, to be preached at Great St Mary's every year, and to be published, at the expense of the

estate, within two months of their delivery. The lectures are directed to be upon the following subjects: 'to confirm and establish the Christian faith, and to confute all heretics and schismatics; upon the divine authority of the holy Scriptures—upon the authority of the writings of the primitive Fathers as to the faith and practice of the primitive Church—upon the divinity of our Lord and Saviour Jesus Christ—upon the divinity of the Holy Ghost—upon the articles of the Christian Faith as comprehended in the Apostles' and Nicene Creeds.' Only men who have taken the degree of M.A., either at Oxford or Cambridge, are qualified for election, and the same person shall never be chosen twice. The first course was delivered in 1780, since when, with the exception of the years 1834, 1835, and 1841, there has been an unbroken series of very valuable, but rather learned than popular discourses. None of these have caused such controversy as the lectures delivered by Dr Hampden (q.v.) in 1832, on 'The Scholastic Philosophy considered in its Relation to Christian Theology,' which were attacked on all sides, their author being accused of Rationalism and Socinianism. Other more eminent lecturers have been Heber (1815), Whately (1822), Milman (1827), and Horne (1828). The course delivered by Dean Mansel (q.v.) in 1858, on 'The Limits of Religious Thought,' also gave rise to much discussion. Since then, Liddon (1886) on Christ's Divinity, Hatch on early Christian organisation (1880), Bigg on the Christian Platonists of Alexandria (1886), Cheyne on the Psalter (1889), Gore on the Incarnation (1891), Sanday on Inspiration (1893), and Illingworth on Personality (1894) have been among the most important. The similar Hulsean Lectures (q.v.) at Cambridge are treated elsewhere.

Ban, a Persian title meaning 'lord,' 'master,' or 'keeper,' and brought into Europe by the Avars. Formerly, it was bestowed on some of the military chiefs who guarded the eastern boundaries of the Hungarian kingdom, and was therefore synonymous with the German *Markgraf*. The ban, who was appointed by the sovereign, but not for life, and whose appointment had to be ratified by the national diet, had originally very extensive powers. In political, judicial, and military affairs, he was the supreme authority within his *Banat*. The most important banats were those of Dalmatia, Croatia, Slavonia, Bosnia, Machow, and Szörény, afterwards formed into the double banat of Dalmatia and Croatia. In 1849, Croatia, Slavonia, and Dalmatia were transformed into Austrian crownlands, and the ban made wholly independent of Hungary; but in 1868 Croatia and Slavonia were reunited with Hungary, with a special local administration for internal affairs, the head of which was called the Ban. Most of these regions fell to Yugoslavia after the great European war. See BANAT.

Ban, a word occurring in most of the modern languages of Europe, and primarily signifying 'to proclaim' or 'publish.' This meaning it retains in *Banns* (q.v.) of marriage. In French military language, *ban* is the part of the population first liable to be called out in case of war; the *arrière-ban* is the reserve. In Germany, the *acht* or *bannum* was a sentence of outlawry pronounced in the middle ages against those who escaped from justice, or refused to submit to trial. We often read of refractory princes, and even cities, being placed under the *ban of the empire*. When a grant of land was made for a religious purpose, or when a charter of liberties was granted, the transaction was proclaimed in public with certain ceremonies, and curses were denounced against any one who should violate the deed. Thus *banning*, or publishing, came to be associated with cursing; and hence the origin of the popular use of the word. It occurs in this sense in Shakespeare and Milton, and other old writers.

Bâṇa, Indian poet of the 7th century A.D., the author of two romances, *Kâdambarî* and *Harshacharita*. See SANSKRIT, p. 88.

Banam, a town of Cambodia, 27 miles SSW. of Pnom-Penh, trades in rice, beans, silk, &c. Pop. 28,000.

Banana, a seaport of Belgian Congo, on the north of the Congo estuary, has a good anchorage, and is an important commercial centre.

Bana'na, the fruit of *Musa paradisiaca*, var. *sapientum*, a herbaceous plant of arboreal proportions and palm-like aspect, belonging to the Musaceæ. It is generally believed to have been

Musa paradisiaca:
a, fruit.

originally of the East Indies, but some have thought that there were bananas in South America before the coming of the white man. Fossil seeds have been reported from Tertiary beds in Colombia. However, it is now found, along with the plantain, distributed and cultivated by man throughout the tropical and subtropical regions of the globe. Between the banana and the plantain (*M. paradisiaca*) there is no real specific distinction. The varieties are very numerous, and run into each other by almost imperceptible gradations, while on the same bunch have been found growing fruits as diverse in form and other qualities as the distinct types commonly known as banana and plantain. To the large-fruited group is often ascribed the more farinaceous quality usually associated with the plantain, and to the small-fruited group the highly saccharine character of the banana. *M. troglodytarum*, a variety of banana remarkable for bearing its clusters of fruit erect (not pendent as in the other edible forms), furnishes food to the natives of the Moluccas, where the plant grows wild.

Though really herbs, the bananas assume all the appearance of trees. Their stems, formed merely of the sheathing bases of the stalks of the large palm-like leaves, enclosing the stalk of the inflorescence, are soft, spongy, and destitute of woody structure, yet attain, according to the different species, the height of from 5 to 25 feet. In the tropics the stems are annual—that is, they

die after perfecting the fruit, and fresh stems are developed from buds in the root-stock, which is perennial. These stems, or rather buds, furnish the common means of propagating and making fresh plantations (the cultivated forms produce no seeds) and the growth is so rapid that the fruit is usually ripe within ten months of the time of planting the offsets. When full grown, the stem is surmounted by a crown of large leaves, 6 to 10 feet long by 2 to 3 feet broad, the blade before it is frayed by the weather resembling the blade of an oar, with a strong fleshy foot-stalk and mid-rib. The flowers spring in great spikes from the centre of the crown of leaves, and are arranged in whorl-like clusters along the spike; the female flowers occupying the base of the spike, and the male the apex. The fruits are variously formed, some being angular, others cylindrical or even spherical, and vary in length from 4 to 12 inches, and in diameter from 1 to 1½ inches. The average weight of a bunch is about 25 lb., but individual bunches often exceed 40 lb.

It is one of the principal sources of food in tropical countries, taking the place of the cereals of more temperate climates. Its productive powers are prodigious; per imperial acre, it was estimated by Humboldt to produce 44 times more by weight than the potato, and 133 times more than wheat. It is stated that the fresh core of the fruit yields about 40 per cent. of dry meal. The more mealy kinds are never eaten raw except when ripe, but in all its unripe stages it is boiled and eaten as a vegetable. It is roasted also and flavoured with the juice of orange or lemon and sugar, and made into compôtes; dried in ovens or in the sun, with the addition of spices and sugar, it is formed into a paste that will keep in a perfect condition for years. In South America, besides forming an indispensable article of diet in its fresh state, it is also an important article of internal trade in the shape of flour. The sugary or luscious kinds are used also in a variety of ways, and preserved by drying. By fermentation it yields a wholesome wine.

The banana is in many other ways useful to man. The fruit specially dehydrated, is a coffee-substitute. The stem yields a juice that is employed as an astringent, and its spongy pith, when pounded and boiled, forms a starchy, tolerably nutritious food. All parts of the plant abound in fibre which can be used for the making of cordage and paper. The top of the stem is boiled and eaten as a vegetable, and the leaves are used in packing, and for many domestic purposes.

There are many other species of *Musa*, the most notable of those besides the banana having edible fruit being *M. Cavendishii*, a very dwarf form, largely cultivated in China; the fruit having similar qualities to the typical form of plantain—i.e. farinaceous rather than saccharine. It is not uncommon in hothouses in this country, being easily cultivated. *M. textilis* (Abaca, q.v.) is the plant that yields the valuable fibre known under the name of Manila Hemp, a product of the Philippine and neighbouring islands. The finer qualities of this fibre are worked into delicate fabrics, so extremely fine that many yards may be inclosed in the hollow of the hand. *M. Ensete*, a native of Abyssinia, does not yield edible fruit, but the flowering stem, before it becomes hard and fibrous, is an excellent esculent. Bruce says: 'When soft, like a turnip well boiled, if eaten with milk or butter, it is the very best of all food, wholesome, nourishing and easily digested.' It is planted out in European parks and gardens. *M. oleracea* is used in New Caledonia as *M. Ensete* is in Abyssinia. See also MUSA.

Bananal (or SANTA ANNA), the name of a large island in the interior of Brazil, formed by the forking of the river Araguay. It is 200 miles in length, and has an area of 8000 sq. miles.

Banaras. See BENARES.

Banas ('hope of the forest'), the name of three rivers of India.—(1) A river of Rajputana, rising in the Aravalli Mountains, flows NE. through Mewar for 120 miles, then SE., and falls into the Chambal, after a total course of 300 miles.—(2) A river which also rises in the Aravalli Mountains, and after a south-westward course of 170 miles, is lost in the Runn of Cutch.—(3) A river of the Central Provinces and Central India, runs north-west for about 70 miles to the Son.

Banat, any district or territory under a Ban (q.v.), but specially applied after 1718 to a part of Hungary which had no separate *ban* or governor. Bounded W. by the Theiss, S. by the Danube, and N. by the Maros, it consisted of the three counties of Temesvár, Torontál, and Krassova. It is partly mountainous and partly flat, is swampy and unhealthy in the west, but is eminently fertile and productive, yielding rich crops of wheat and other grain. The mines are valuable. The principal town is Temesvár. It was formed into an Austrian crown-land in 1849, but was incorporated with Hungary in 1860. After the World War the mountainous part fell to Rumania, the flat to Yugoslavia.

Banbridge, a town in County Down, Ireland, on a steep slope on the left bank of the Bann, 76 miles N. of Dublin. It is a thriving seat of the linen manufacture in all its stages. Miles of bleaching-greens exist in the vicinity, and numerous factories along the Bann. Pop. (1926) 4852.

Banbury, a municipal borough of Oxfordshire, on the Oxford Canal and the Cherwell, 23 miles N. of Oxford, and 78 NW. of London by rail. Its strong castle, built about 1125, was several times besieged during the Great Rebellion, and demolished shortly after. Its 'goodly cross' of undying nursery rhyme fame was destroyed in 1602 by the Puritans—indeed, Banbury of the time was noted for Puritanical zeal. A new cross was erected in 1859, and added to in 1914. In 1469 the Yorkists were defeated in the vicinity. The town is still famous for its cakes and ale, as in Ben Jonson's day; and it manufactures webbing and agricultural implements. Among the buildings are the parish church (1797) and the town-hall (1854). Pop. 13,000 (a third in the town proper). See A. Beesley, *History of Banbury* (1841).

Banc, legally a seat or bench of justice, has in this sense given rise to the expression of the English courts of common law 'sitting in banc,' or *in banco*. In the sittings of the common law courts 'in banc' the court ordinarily consisted of four judges. The business there transacted was transferred by the Judicature Act, 1873, to the Divisional Courts of the High Court of Justice, now consisting of two or more judges.

Banca (*Banka* or *Bangka*), an island 157 miles long, 8 to 20 broad, separated from Sumatra to the NW. by the Strait of Banca. With a few contiguous islands it forms the Dutch Residency of Banca, with an area of about 4500 sq. m., and a pop. calculated in 1925 at 160,000. Chinese are very numerous. The surface is for the most part level or undulating, but the island is by no means fertile, the banana and the durian being its only fruits. Gold, iron ore, silver, lead, and amber are found, but tin is the chief mineral. The tin-mines (over a hundred) are a government monopoly. The once dense forests have been terribly thinned for smelting purposes. The principal imports are rice, salt, and European goods. The capital, Muntok, in the north-west part of the island, has a fort and 3000 inhabitants.

Banchieri, ADRIANO (*c.* 1567–1634), Italian organist, composer, and poet, who eventually became abbot at Monte Oliveto, was born at Bologna, where he founded in 1623 the Accademia Florida. His compositions include both sacred and profane works—his *La pazzia senile* (1598) has been called the first comic opera—and he was especially interested in the dramatic uses of the madrigal. Chief amongst his writings on theory were his *L'organo suonarino* (1605) and *Moderna practica musicale* (1613). He died at Bologna.

Banchory, a small town of Kincardineshire, picturesquely situated on the river Dee, 18 miles SW. of Aberdeen. Near by are reservoirs for Aberdeen's water-supply. The town has cattle-markets. Pop. 2000.

Banco (It.), a commercial term meaning the standard money in which a bank keeps its accounts, as distinguished from the current money of the place. The distinction was more necessary when the currency was depreciated, or when it consisted, as it often did, of clipped, worn, and foreign coins. These the early banks (Venice, Amsterdam, &c.) received at their intrinsic worth, and credited the depositor in their books with this bank-value. The term was chiefly applied to the money in which the Hamburg bank kept its accounts, before the adoption of the new universal coinage of the German empire. It was not represented by any coinage. See also BANC.

Bancroft, GEORGE, principally distinguished as the author of the history of his country, but not without note as a diplomatist, was born in Worcester, Massachusetts, October 3, 1800, son of the Rev. Aaron Bancroft, author of a Life of Washington. At thirteen he entered Harvard College, graduated with high honours in 1817, and spent two years in study at Göttingen, Germany, where in 1820 he received the degree of Doctor of Philosophy. Returning to America in 1822, he served a year as Greek tutor in Harvard College when he and Dr Cogswell, a fellow-tutor, established the Round Hill School at Northampton, Massachusetts, with which Bancroft was associated until 1830. In 1823 he published a volume of poems, and subsequently made translations from the German of the minor poems of Goethe, Schiller, &c., and of some of the historico-political works of Heeren. In 1834 appeared the first volume of his *History of the United States from the Discovery of the Continent;* followed by the second and third volumes in 1837 and 1840 respectively—the whole embracing *The History of the Colonisation of the United States.* These were succeeded in the interval from 1852 to 1860 by five volumes narrating the history of the colonial period to the Declaration of Independence, and in 1866 and 1874 respectively by the two concluding volumes, bringing the history to the treaty of peace with the mother-country in 1782. Bancroft subsequently published *The History of the Formation of the Constitution of the United States* (2 vols. 1882), which afterwards formed a constituent part of the revised edition of the complete *History of the United States,* embraced in six volumes (1882–84). In his political sentiments, Bancroft in early life was a democrat. He served as collector of the port of Boston (1838–41), under President Van Buren, and was an unsuccessful candidate for the governorship of Massachusetts in 1844. He accepted a seat in the cabinet of President Polk as secretary of the Navy in 1845, and the following year was appointed minister to the court of St James, a position which he filled until 1849, with honour to his country. A period of retirement from public life followed his return to America. In the civil war he was heartily in accord with the national government, and in 1867 he was appointed by President Johnson minister to Berlin, serving with distinguished ability until recalled at his own request in 1874. He afterwards lived in Washington till his death on 17th January 1891. See *Life and Letters* by De Wolfe Howe (1908).

Bancroft, HUBERT HOWE (1832–1918), North American historian, born at Granville, Ohio, settled at San Francisco in 1852, where he started a bookshop, and soon amassed a large fortune. He formed at a vast expense, and gave to the university of California, a library of 60,000 volumes, mainly on old American history and ethnography. A part of the books collected for Maximilian of Mexico came into his possession. One result of his studies is *The Native Races of the Pacific States* (5 vols. New York, 1875–76), forming the first portion of his colossal undertaking, a *History of the Pacific States of North America* (40 vols. 1882 *et seq.*). Other works are *Chronicles of the Builders of the Commonwealth* (7 vols. 1891–95), and a book on Mexico (1894).

Bancroft, RICHARD, Archbishop of Canterbury, and a bitter opponent of the Puritans, was born at Farnworth, Lancashire, in 1544. Sent to Cambridge by his uncle, Hugh Curwen, Archbishop of Dublin, he took his B.A. in 1567, and in 1576 became rector of Teversham, Cambridgeshire. Other preferments followed in rapid succession, until in 1597 he was consecrated Bishop of London. He attended Elizabeth during her last illness; and at the famous Hampton Court Conference under James I., he was one of the chief commissioners on behalf of the Church of England. Archbishop of Canterbury from 1604, he died 2d November 1610. He strove to make the Catholics faithful to the crown by cherishing the secular clergy as against the Jesuits (see ARCHPRIEST); and by taking sides with the Puritans made possible the reconstruction of the church. See R. S. Usher, *The Reconstruction of the English Church* (1910).

Bancroft, SIR SQUIRE (1841–1926), born in London, appeared first on the stage at Birmingham in 1861, and in 1861 came to the Prince of Wales's in London. In 1867 he married Miss Marie Effie Wilton (*c.* 1840–1921), a distinguished actress, born at Doncaster, who in 1865 had begun the management of the Prince of Wales's in partnership with H. J. Byron. Under 'the Bancrofts' the theatre was famous for its perfect representation of J. W. Robertson's plays, *Caste, School,* and the rest, husband and wife taking the principal parts. In 1880 they moved to the Haymarket, but retired in 1885. Sir Squire Bancroft was knighted in 1897. See two autobiographical works by them (1888 and 1909).

Band, in architecture, is any flat fascia or ornament continued horizontally along a wall; also a moulding or suit of mouldings encircling a shaft.

Band, or BANDS, linen pendants from the neck, forming part of clerical, legal, and academic costume. It is a moot question whether they are a survival of the Amice (q.v.), or immediate descendants of the wide falling collar which was a part of the ordinary civilian dress in the reign of James I. In the Anglican Church they now are seldom worn, except by ultra-Low Churchmen; but they are in common use with Presbyterian ministers (ordained ministers as distinguished from licentiates). Foreign Catholic ecclesiastics wear black bands with a narrow white border.

Band. *Military Bands* differ from full orchestral bands in being wholly composed of wind-instruments and drums. The musical instruments allowed by government to regiments were formerly confined to trumpets and bugles for the cavalry and artillery, and fifes, bugles, bagpipes, and drums for the infantry and Highland regiments.

The drummers and fifers (or buglers) are supposed to be able to play either instrument, and are commanded by a drum-major, from 1878 to 1928 called sergeant-drummer. The Highland regiments have each, in addition, pipers and a pipe-major (sergeant-piper), who form a special pipe band. Cavalry regiments have trumpeters and a trumpet-major (sergeant-trumpeter.)

To meet the instrumental and other expenses of a full musical band, the officers, till 1904, contributed to a band fund. Cavalry regiments usually possess a double band (composed of the same performers)—namely, a *brass* band for mounted duty, consisting generally of valved brass instruments, treble, tenor, and bass, which can be played with one hand, leaving the other free for the management of the horse; and a *reed* band for dismounted duty or 'programme performance,' in which clarionets, flutes, bassoons, &c. are included. In marching regiments, where the performers have the use of both hands for their instruments, the selection is wider.

The following may be given as a representative type of a regimental band in the British army: E♭ piccolo and flutes, two E♭ clarionets, two oboes, four B♭ clarionets, E♭ alto and B♭ tenor saxophones, two bassoons, four horns, two B♭ cornets, two B♭ trumpets, two tenor and bass trombones, euphonium, two basses (E♭, B♭), bass drum and side drum. Many regiments also have performers able to play stringed instruments, usually violoncello and double bass, to assist in the performance of classical music; some regiments even possessing a full string band.

Military music began to assume a position of definite importance about the middle of the 18th century. Frederick the Great interested himself in the subject, while at the end of the century the Napoleonic armies contained some very efficient bands. Progress in the Prussian army was rapid under the direction of Wilhelm Wieprecht (1802–72), who made many instrumental and other improvements and conducted a massed band performance in Berlin in 1838. No less renowned in France was Adolphe Sax (1814–94). Development in the British army was slow. Previous to 1857, the bandmasters in the army were almost always private individuals, mostly foreigners, engaged by the officers to instruct the band, and young players were taught by them and the band-sergeant. In that year, however, government instituted a school of military music at Kneller Hall, Twickenham. At first it occupied the same anomalous position as the bands themselves, being partly supported by government and partly by a contribution of £10 per annum from each regiment; but in 1867 the War Office took it over as a government school, and now pays the entire expenses. It has a director of music and a staff of professors. The primary object of this school is to train promising musicians, who are non-commissioned officers recommended by their commanding-officer for the position of bandmasters. Students undergo a probationary period of six months. Thereupon, in a course lasting about three years, they are fully instructed in harmony, counterpoint, composition, orchestration, the technique of the various military musical instruments, and general knowledge, musical and otherwise. The army is now altogether supplied with bandmasters from this college. They belong to the service, and are warrant-officers (a rank specially introduced into the army for their benefit). Kneller Hall also trains such young instrumentalists for regimental bands as are recommended by bandmasters from among the most promising of their boys. When a boy is recommended to Kneller Hall, he is kept for a year, thoroughly instructed in the use of his instrument, and returned to his regiment; and if he has talent and behaves himself, he has a good chance of eventually rising to the position of bandmaster.

The duty of regimental bands is to play at regimental parades, at 'marches out,' to the officers at mess, and when required by the officers. Formerly the music required by the band had to be arranged and 'scored' by the bandmaster, but there are now many journals published (the earliest, Boosey's *Military Journal*, 1846) with arrangements of all kinds of music for military bands, thus relieving the bandmaster from much of his hardest work.

Naval Bands.—Flag-ships carry bands, but other large ships (commanded by officers not less in rank than a captain) usually also do so. They are supplied from the Naval School of Music at Eastney Barracks, Portsmouth.

Amateur Bands are now common throughout the country, nearly every small town having its 'instrumental band.' Some of the amateur bands of Yorkshire, Lancashire, and Cumberland, consisting mostly of working men engaged in mills, iron-works, or collieries, are really good, executing all kinds of music in an astonishingly creditable manner, considering their opportunities for practice. Many districts have their annual brass band contests, at which considerable sums of money are given as prizes. For other bands, see ORCHESTRA. See also articles on the various instruments, as BASSOON, HORN, &c.

Banda, chief town of a district in the United Provinces, India, 95 miles SW. of Allahabad, on the right bank of the Ken River; pop. 21,000. It is a great mart for cotton, and possesses a large number of mosques and temples.—The *district* of Banda contains 3061 sq. m., its chief product being cotton, though millet, rice, and other grains are also grown; pop. 657,000.—(2) A Tahsil on the north-east of the Saugur district, Central Provinces, India.

Bandages are used by surgeons to keep a part of the body at rest, to apply pressure, or to retain dressings or apparatus in position. There are two chief varieties—the roller, and the triangular handkerchief bandage. The former is that most used for applying pressure and retaining dressings: the latter for fixing splints and as slings, and as an immediate surgical appliance in cases of accident or emergency.

Fig. 1.—Roller Bandage.

The Roller Bandage is a strip of calico, flannel, or elastic webbing, six yards long; its breadth should be one-fifth of the average circumference of the part to which it is applied. In applying it to a limb, it must commence at the extremity, and pass upwards without interruption towards the trunk. It must cover the whole surface, and exert gentle and equable pressure throughout, especially in regions likely to be dependent, since swelling and discomfort occur at points where the bandage is absent or too slack; too tight bandaging, on the other hand, may hinder the circulation and lead to mortification of the part. Both edges of the bandage must be equally tight, or it will not lie smoothly on the limb, but will gape and tend to slip off. No two skin surfaces (e.g. two fingers) must be bound in contact, since the accumulation and decomposition

of cutaneous secretions between them will give rise to irritation. This can be avoided by interposing a layer of absorbent, antiseptic material, such as boracic lint. When a harsh and inelastic bandage is used, it must not be applied directly to the surface, but over closely fitting woollen hose, arm-gloves, &c., which mitigate its pressure and protect the skin. A soft bandage may be applied directly; elastic webbing must only be applied over thick dressings or layers of cotton-wool that distribute and equalise the strong pressure it exerts. A bandage will slip unless both its ends are secured. In commencing to bandage any part of a limb, fix the roller by passing it round alternately above and below the prominence of the nearest available joint; then cover the part to be bandaged by encircling it with coils of bandage applied consecutively from below upwards, each loop covering the upper two-thirds of that previously applied. In parts where the limb thickens rapidly from below upwards, the bandage must be frequently 'reversed' to make it lie smoothly. Holding steady the loops already applied, the bandage is folded sharply upon itself from above downwards, so that the external surface of the loop next applied is the same that was next the skin in the previous loop. This corrects the tendency to leave portions of skin uncovered in conical parts of a limb. The bandage is fastened by a safety-pin, which should traverse several layers of the roller and any texture introduced between the bandage and the skin. The toes and finger-tips should be left uncovered; if they look dusky or become cold, it shows that the bandage is too tight, and must be at once loosened or removed.

The Handkerchief Bandage (fig. 2) is a triangular piece of cotton cloth, made by cutting a square yard of the material diagonally from corner to corner. It may also be constructed from an ordinary pocket-handkerchief, by dividing it in the same way, and combining the two small triangles thus produced into one larger triangle by tacking together two of their shorter sides (see fig. 2, B). When thus constructed, the bandage consists of a peak (fig. 2, A, P′), two sides (S′ S′), two tails (T′ T′), and a base (B′). This appliance may be used for a great number of purposes in addition to those for which the roller bandage is applied. If it be desired to fix dressings in position, and to cover a large area of the body surface, it is used unfolded. If it be required to apply pressure firmly and locally, or to fix dressings, splints, or other applications on movable parts, it is folded into a broader or narrower cravat form, as shown in fig. 2, C, and is thus applied to the part in question. In folding the bandage, the peak is turned over, so as to touch the middle part of the base (C, 1), and the handkerchief is then folded upon itself longitudinally to one-half or one-third of its present breadth, according to the larger or smaller circumference of the limb it is intended to encircle, and the size of the area it is desired to cover. For most purposes the narrower form (C, 2) will be found most convenient, since it adapts itself more easily to the inequalities of the part to which it is applied. In its unfolded form the handkerchief is used as a covering for the head (fig. 2, *a*), and as a support to dressings applied to the shoulder (*b*), chest (*c*), stump (*e*), hand (*f*), foot (*g*), and hip (*h*). In this form also it is

Fig. 2.

used as the ordinary sling for injuries of the upper extremity (*i*), where the weight of the arm is supported by the patient's neck and shoulders, and the injured parts are thus saved from strain and kept at rest. If this be supplemented by a second handkerchief bandage, folded narrow, which encircles the chest and the injured arm above the elbow (*j*), the whole upper extremity is not only supported but kept firmly immovable; which adds greatly to the comfort and safety of a patient immediately after an accident, during his transference to a hospital or to his home. In its folded form it makes an admirable temporary support to injured joints, such as the wrist (*k*), ankle (*l*), elbow (*m*), and knee (*n*), and in wounds of the eye (*o*), scalp (*p*), arm (*q*), thigh (*r*), &c., while the careful application of such a bandage satisfactorily supports the jaw (*s*) in cases of severe bruising or fracture. One of its most important uses in the narrow cravat form is to fix improvised splints *in situ* in cases of fracture of the extremities (*t*, *u*, *v*, and *w*). In this form it is also used as a wrist or hand sling (*x*), where the wrist-joint only is injured, and alone needs to be supported, or where a wound of the hand necessitates that member's complete rest. In cases of severe bleeding from wounds of the extremities, it should be used as a *tourniquet* (q.v.). If the bleeding be of a *spirting* character, it implies that an artery of considerable size is divided. In this case the bandage must be made to encircle the limb higher up than the seat of the wound, and must be tightened by

twisting (*y*) until the limb is completely constricted and the bleeding temporarily arrested, while immediate surgical assistance is sought for. If the bleeding be of an *oozing* character, the bandage is not applied higher up the limb than the wound, but over the wound itself. A stone or other hard substance is firmly wrapped in a piece of cotton cloth or lint and thrust into the wound, and the cravat-handkerchief applied around the limb at the part sufficiently tight to hold this extemporised plug in position (*z*). Here, the object is not to control the circulation of the whole limb, but to prevent the escape of blood from the wound. This can be greatly assisted by attending to the position of the wounded limb in relation to the law of gravitation. In such circumstances it is usually sufficient, after applying the plug and bandage, to support the upper extremity in a sling, and to prop up the lower extremity on a high pillow. Should this, however, prove ineffectual, it is well to try firm flexion of the joints above the wound, which usually stops the bleeding. If this too fail, the whole limb must be constricted by the twisted handkerchief as above described; which, however, one would gladly avoid if possible, since it is a source of great suffering to the patient. In securing the ends of the bandage, they should either be tied together with a 'reef' knot (*), which will hold firmly, in contradistinction to the 'granny' knot (†), which tends to slip; or if the knot from its position cause discomfort to the patient, it should be dispensed with, and the two ends of the handkerchief sewn together with strong thread or sewing worsted. The figure represents the handkerchief bandage supplied by the St Andrew's Ambulance Association to its members for use as a 'first aid' to the injured in cases of accident and emergency.

Banda Isles, a portion of the Moluccas, consisting of 12 islands, 6 of which are uninhabited, about 50 miles to the south of Ceram. Their mean lat. and long. respectively are 4° 30′ S., and 129° 50′ E. Area, 17 sq. m.; pop. estimated at 500 Europeans and half-castes, and 8000 natives, mostly descendants of the emancipated slaves. The chief productions are nutmeg and mace, of which large quantities are exported. An active volcano, Gunong-Api (1744 feet), rises near the centre of the group. In 1801–14 the islands were acquired by the Dutch.—The BANDA SEA, in which the islands are situated, is enclosed by the islands of Buru and Ceram in the north, the sea of Flores in the south-west, and the Timor-Laut, Kei, and other islands in the south-east

Bandai-san, a volcano, with several peaks about 6000 feet high, near the centre of the main island of Japan.

Bandajan′, a pass over a range of the Himalayas, in Kashmir; the summit being 14,854 feet above the sea.

Bandama, a river of the Ivory Coast, flowing southwards into the Gulf of Guinea; the main stream is formed by the junction of the White and the Red Bandama about 200 miles from the sea.

Bandan′a, a kind of printed handkerchief of Indian origin, now extensively made in Britain, usually of cotton. The cloth is first dyed Turkey red, and then the pattern is made by discharging the colour with bleaching liquor in a powerful Bramah press. The pattern to be discharged is cut out on two plates of such metal (lead) as may not be acted on by the liquor, and of the full size of the handkerchief. A dozen or more are put in at once between the plates, and so many of these courses are entered together as fill the press, when the pressure is applied, and the liquor is run in on the uppermost plate, which is grooved on the upper side to receive it, and holed to pass it from plate to plate through all the cloth-folds in the press. The pressure on the cloth, to make clean work by preventing the spreading of the liquor, is enormous. The patterns in the real bandana style of printing are spots and diamond prints, the best suited for discharging, and even for these a pressure of 500 tons is required to work them clean. See CALICO-PRINTING.

Banda Oriental, a state of South America, constituted in 1825, after a war between the colonists (from Buenos Aires) and Brazil, as Banda Oriental del Uruguay—'Eastern Bank of the Uruguay,' now usually called simply Uruguay (q.v.).

Bandar Abbas. See BENDER ABBAS.

Bande, a town of Spain, 21 miles WSW. of Orense; grain and flax are grown and cattle raised in the vicinity. Pop. 6000.

Bandel, ERNST VON, sculptor, was born in 1800 at Ansbach, studied art at Munich, Nürnberg, and Rome, and from 1834 lived chiefly at Hanover, engaged, off and on, for forty years on his great monument of Arminius, near Detmold, 90 feet high, which was unveiled by the Emperor Wilhelm on 16th August 1875. He died near Donauwörth, September 25, 1876.

Ban-de-la-Roche, or STEINTHAL, a valley of Lower Alsace, in the Vosges Mountains, noted as the scene of the labours of Oberlin (q.v.).

Bandelkhand. See BUNDELKHAND.

Bandello, MATTEO, an Italian writer of *novelle* or tales, was born about 1480 at Castelnuovo in Piedmont. In early life he became a Dominican monk at Milan, but soon abandoned this vocation. After the battle of Pavia (1525) he was driven from Milan by the Spaniards, and settling in France, was in 1550 made Bishop of Agen. He died in 1562. Bandello's tales, 214 in number (4 vols. 1554–73), rank next to those of Boccaccio in Italy, and furnished themes to Shakespeare, Massinger, and other dramatists. They are distinguished by unaffected simplicity of style, fluency and vividness of narrative, and a harmonious brevity of periods. Geoffrey Fenton's translation (1567) was modernised by H. Harris (1924).

Band-fish (*Cepola*), a genus in the family Cepolidæ in the blenny-form division of Acanthopterygious Fishes (q.v.). The body is much elongated and laterally compressed, and is covered by very small scales. The dorsal fin is very long, and consists like the anal of soft rays. The tail vertebræ are very numerous, and the whole structure of the body exhibits unusual delicacy, so that specimens are seldom obtained in an uninjured state. All the species inhabit quiet depths, and are unable to contend with waves and currents. The snakelike form and the beauty of their colours make them objects of great interest. One species, the Red Band-fish (*C. rubescens*), not uncommon in the Mediterranean, is occasionally cast ashore by storms on the British coasts. It is about 15 inches long. Its brilliant appearance, when seen moving in the water, has suggested the names of Fire-flame and Red Ribbon, by which it is known at Nice. The home of the genus is in Japanese waters.

Bandicoot (*Perameles*), a genus of small marsupials, occupying in the fauna of Australia a place somewhat analogous to that of the much higher shrews in Europe. Like the 'native rabbit' (*Macrotis lagotis*) and the peculiar form known as *Chœropus*, the bandicoots stand midway between carnivorous marsupials like the Tasmanian Devil, and the vegetarian Kangaroos, resembling the former in their dentition, the latter in the structure of the hind-feet. They have

altogether 48 teeth, suited to their mixed diet of insects, worms, and roots, and have 10 upper incisors to 6 lower. In the fore-feet the three middle toes are long and clawed, the two outer rudimentary and clawless. The hind-feet are long and narrow, with only the fourth toe well developed.

Bandicoot (*Perameles nasuta*).

The fur is short and rough. The long head forms a pointed snout, the tail is rather short, the marsupial pouch is complete and opens backwards. They keep to the ground, making nests in the hollows, and ravage farm produce. The largest form (*P. nasuta*) measures about a foot and a half from tip of snout to origin of tail. Numerous species occur in Australia and New Guinea. The genus is of great zoological interest because of the occurrence of a true allantoic placenta, which is absent in other Marsupials (q.v.). See ALLANTOIS, PLACENTA.

Bandicoot Rat, MALABAR RAT, or PIG-RAT (*Mus giganteus* or *Nesocia bandicota*), the largest known species of rat. The name is derived from the Telugu *pandikokku*, signifying pig-rat. The animal inhabits many parts of India, and is plentiful in Ceylon. It is chiefly found in dry situations, and often in hilly districts. It attains the weight of two or three pounds, and is 24 to 30 inches long, including the tail, which at the base is 2½ inches in circumference. The body is thick, and greatly arched, black above, grayish below. Its flesh is a favourite article of food with the coolies of India, and is said to be delicate, and much to resemble young pork. It feeds chiefly on grain and roots, and is very destructive in gardens. Its nests, when rifled, are frequently found to contain considerable quantities of rice, stored up against the dry season.

Bandiera, ATTILIO and EMILIO, two brothers of a Venetian family, lieutenants in the Austrian navy, who attempted a rising in favour of Italian independence in 1843. The attempt was a failure, and they fled to Corfu; but, misled by false information, they ventured to land in Calabria with twenty companions, believing that their appearance would be the signal for a general insurrection. One of their accomplices had betrayed them, and the party was captured at once by the Neapolitan police. Attilio and Emilio were shot along with seven of their comrades in the public square of Cosenza on the 25th July 1844. Both were men of lofty spirit, and their enthusiastic patriotism breathes in every line of their letters to Mazzini, who was then in London. These letters were opened by authority of the British government; see Parker's Life of Sir James Graham (1907) and the life of the brothers by Pierantoni (1909).

Bandinelli, BACCIO, the son of a famous goldsmith of Florence, and one of the best sculptors of his time, was born at Florence in 1493. He was an angry and jealous rival of Michael Angelo, whose grandeur of conception he strove to equal, and who is said to have retaliated his enmity by contempt. His genius, however, secured him many admirers and patrons among persons of distinction, and Pope Clement VII. even bestowed on him an estate. Among his best works, which all exhibit power, vigour, and skilful drawing, are his colossal group of Hercules with Cacus at his feet, his Adam and Eve, his copy of the Laocoön, and the exquisite *bassi-rilievi* which adorn the choir of the Duomo in Florence, where he died in 1560.

Bandit. See BRIGANDS.

Band of Hope, the name given about 1847 to societies of young people, pledged to abstain from all intoxicating liquors. Now nearly every town and village of the United Kingdom contributes its quota of adherents, and since 1889 qualified lecturers give lectures in thousands of day-schools. The United Kingdom Band of Hope Union (1855) had by 1919 affiliated with it some 30,000 societies of juvenile abstainers, having more than three millions of members. See TEMPERANCE.

Ban'doline is a mucilaginous substance used for stiffening hair, and keeping it in shape or form. It is usually prepared from gum tragacanth, two ounces of which, when digested with a quart of rose-water for two days at a gentle heat, yield a translucent jelly, which is further perfumed by the addition of otto of roses, or oil of bitter almonds. It is also prepared by boiling Carrageen (q.v.) or Irish-moss with water, or by soaking quince-seeds in cold water for a day or two.

Bandon, or BANDONBRIDGE, a town of County Cork, Ireland, on the Bandon, 20 miles SW. of Cork by rail. Bandon was founded in 1608 as a Protestant colony by the first Earl of Cork, was incorporated by James I., and now belongs chiefly to the Duke of Devonshire. Brewing, distilling, and tanning are the chief industries. The pop., which was 6131 in 1871, had diminished to 2816 in 1926. Up till 1885 Bandon returned one member to the House of Commons.—The river Bandon rises in the Carberry Mountains, and at its mouth forms the harbour of Kinsale. Spenser describes it as 'the pleasant Bandon, crowned by many a wood.' It has a course of 40 miles, for 15 of which it is navigable to Innishannon, 4 miles below Bandon.

Bandong, or BANDUNG, a flourishing commercial town in the centre of the western end of Java, in the vicinity of the volcano Gunong Guntour. Since 1864 it has been the capital of the Preanger Regencies province. Pop. 136,000.

Bandurria, a musical instrument, somewhat like a guitar, popular in the south of Spain; it has six double strings (3 gut and 3 covered silk), and is played with a plectrum.

Bandy. See HOCKEY.

Bandy Legs. See LEG.

Baneberry, or HERB CHRISTOPHER (*Actæa spicata*), is a native of Europe, occurring rarely in the north of England. It is a perennial herb, with leaves ternately compound, deeply serrate, the flowers in racemes, the berries black and poisonous. The root has been used in medicine, but is of dubious reputation; those of two North American species (*A. spicata* and another) were in high esteem among the Indians, especially as remedies for snake-bites. The genus is included in Ranunculaceæ.

Banér, or BANNER, JOHAN (1596–1641), the ablest of the generals of Gustavus Adolphus, was born at Djursholm and served with distinction in the Swedish wars with Russia and Poland. In the Thirty Years' War he contributed in no small degree to the success at Breitenfeld (1631) and gained the important victory of Wittstock (1636). He defeated the Saxons at Chemnitz in 1639, and in the winter of 1640–41 a thaw foiled his daring attempt to surprise Ratisbon. He died soon after at Halberstadt. See THIRTY YEARS' WAR.

Banes, a seaport on the north coast of Cuba, 32 miles ENE. of Holguin, has a good harbour and a trade in bananas, sugar, coffee, and cocoa; pop. 10,000.

Banff (pron. *Bamf*), a seaport, once a parliamentary burgh, capital of Banffshire, on the Moray Firth, at the mouth of the Deveron, 50 miles NNW. of Aberdeen by rail; its former Low Town and Sea Town now form a continuous whole. On the right bank of the Deveron, 1¼ mile ENE., is the fishing-town of Macduff. Scarce a fragment remains of the old castle, in which Archbishop Sharp was born; the present castle is a plain 18th-century edifice. Duff House was built in 1745 by the elder Adam. In 1907 it was given to the town of Banff by the Duke of Fife, and later became a hospital. The public buildings include a town-house (1796), the county buildings (1871), a lunatic asylum (1865), Chalmers' Hospital (1862), and a museum, of which Thomas Edward (q.v.) was long curator. With Elgin, Cullen, Inverurie, Kintore, and Peterhead, Banff (including Macduff) sent one member to parliament till 1918, when it was merged in the county. Pop. (burgh of Banff), 3500; (burgh of Macduff), 3300.

Banff, a summer resort, with hot sulphur springs, in the magnificent mountain country of south-west Alberta, is on the Bow River and the Canadian Pacific Railway, 920 miles W. of Winnipeg. It is the railway centre for the Rocky Mountain National Park (with an area of 5000 sq m.). Pop. 1000.

Banffshire, a county in the NE. of Scotland, on the Moray Firth, and between the counties of Aberdeen and Elgin and Inverness. Standing fourteenth in area of the Scottish counties and (in 1921) sixteenth in population, its greatest length is 59 miles, its greatest breadth is 31, and its area is 630 sq. m. The surface, especially in the south and south-east, is mountainous, interspersed with fertile valleys and fine pastures; but near the coast it is comparatively level. The chief mountain-ranges, rivers, and strike of the stratified rocks, run from south-west to north-east, and the whole county is an extensive slope in the same direction, from the Grampians to the Moray Firth, into which the rivers flow. The coast is rocky, but not high, except to the east of Banff. Chief summits are the Bin of Cullen (1050 feet), Knock Hill (1409), Meikle Conval (1867), Ben Rinnes (2755), and, on the Aberdeenshire border, Ben Macdhui (4296). The chief rivers are the Spey, which bounds a third of the county on the west; and the Deveron, 61 miles long, and mostly included within the county. The predominant rocks are granite, quartz rock, mica-slate, clay-slate, syenitic greenstone, graywacke, graywacke-slate, old red sandstone with fossil fishes, metamorphic limestone and serpentine. The serpentine near Portsoy has long been famous as the 'Portsoy marble.' Lead, iron, antimony, and plumbago occur in small quantity. The soil in many parts is very fertile, and highly cultivated. About 38 per cent. of the entire area is in cultivation, more attention being paid to the breeding of cattle than to crops. The manufactures are unimportant, Glenlivet whisky excepted. The herring-fishery is largely carried on; and the salmon-fisheries of the Spey and Deveron are very valuable, the Spey ranking after the Tweed and Tay as a salmon-river. The southern part of Banffshire is in the Highlands, the north being purely Lowland in aspect as in race-characters. Banffshire is divided into the districts of Enzie, Boyne, Strathisla, Strathdeveron, Balveny, Glenlivet, and Strathavon. The chief towns and villages are Banff, Macduff, Portsoy, Keith, Cullen, Buckie, Dufftown, and Charlestown of Aberlour. The counties of Banff, Aberdeen, and Elgin enjoy the Dick Bequest (see DICK, JAMES) for parochial education. The county returns one member to parliament. Banffshire contains numerous remains of antiquity, as the old churches of Gamrie and Mortlach, and the ruined castles of Auchindoun, Balvenie, Boharm, and Findlater. The battle of Glenlivet (q.v.) was fought in 1594. Pop. (1801) 37,216; (1841) 49,670; (1881) 62,736; (1911) 61,402; (1921) 57,293.

Bánffyhunyad, or HUEDIN, a market town of Transylvania, 28 miles W. of Cluj, Rumanian since 1920; pop. 5000.

Bangalore, a fortified town and administrative headquarters of Mysore, in a district of the same name, 216 miles W. of Madras by rail. When Mysore was occupied by Britain in 1831, Bangalore was made the administrative capital of the state; and when in 1881 Mysore was restored to the rule of its maharaja, the British cantonment of Bangalore, containing the Residency, was specially exempted from native jurisdiction. Silk and carpets are the principal manufactures; and there is a brisk trade. Lying 3000 feet above sea-level, in the middle of the Mysore tableland, Bangalore has a cool and healthy climate. It was a favourite residence of Hyder Ali; and in 1791 it was stormed by the British under Lord Cornwallis. It is still by far the largest city in the state; but the town of Mysore is now the dynastic capital and residence of the maharaja. Pop. (1921) 238,111. There is here a great institution for post-graduate instruction and research in science; also two of the constituent colleges of Mysore University.

Bangiaceæ, an order of seaweeds doubtfully classed with the Rhodophyceæ, though they differ from ordinary red seaweeds in some important points of structure. The thallus is composed of filaments or plates, one cell thick, without pits between the cells. Reproduction is sexual and asexual. Female reproductive cells differ but slightly from ordinary thallus cells. It is a small order, but world-wide. Porphyra (laver) and others are common on the British coasts.

Bangkok, capital (since 1769) and chief port of Siam, situated on both banks of the Menam, about 20 miles from its mouth. The population is 930,000, over one-fourth being Chinese, the others including Burmese, Annamese, Cambodians, Malays, Eurasians, and Europeans. The approach to Bangkok by the Menam is exceedingly beautiful. Stone buildings are used for the royal palaces, some noblemen's houses, monasteries, and the dwellings of Europeans. A large number of the houses float on rafts, fastened by ropes to poles; most of the trade of the city is conducted upon the river. The internal traffic of Bangkok is in large measure carried on by means of canals, but of late years a number of ordinary thoroughfares have been constructed, and many brick houses have been erected. The older-fashioned native houses on land—of bamboo or other wood, like the floating-houses—are raised upon piles, 6 or 8 feet from the ground, and are reached by ladders. The circumference of the walls of Bangkok, which are 15 to 30 feet high and 12 broad, is about 6 miles. Bangkok is the constant residence of the king. The palace is surrounded by high walls, and is nearly a mile in circumference. It includes temples, public offices, accommodation for officials and for some thousands of soldiers, with their necessary equipments, a theatre, apartments for a crowd of female attendants, and several Buddhist temples or chapels. Several of the famous white elephants are kept in the courtyard of the palace. Throughout the interior are distributed the most costly articles in gold, silver, and precious stones. The

temples of Bangkok are very numerous, and are decorated in the most gorgeous style. The foreign trade of Siam centres in Bangkok, and is mainly in the hands of the Europeans and Chinese. A bar at the mouth of the Menam compels vessels drawing more than 13 feet to anchor at Paknam. Imports include cotton and silk goods, provisions, iron, steel and machinery, gunny-bags, opium, sugar, tobacco; and exports (chiefly to Singapore and Hong-kong), rice, teak (declining), hides, marine products, timber, sticklac, pepper. Since 1893 Bangkok has made marked progress in many directions; witness its numerous rice and saw mills, shipbuilding and engineering yards, dry-docks, modern thoroughfares, gas and electric lighting, electric tramways, new water-supply (1914), various educational institutions (including a university, inaugurated 1917), and extensive railway and telegraphic communications. There are telegraph-lines to Penang, Burma, and Cambodia; a wireless station; railways to Paknam (14 miles), eastwards to Korat (165 miles), northwards to Chieng-Mai in the Shan States, and southwards (Malay Peninsula Railway) to Sengora and Straits Settlements. In 1893 French warships forced their way to Bangkok, and secured a treaty making important concessions to France. See SIAM.

Bangor, an episcopal city, parliamentary borough, and seaport of Carnarvonshire, North Wales, on the SE. shore of the Menai Strait, 60 miles W. of Chester. Its fine scenery and educational institutions have made it a favourite resort, and the opening of the Chester and Holyhead Railway (1850) greatly promoted its prosperity. The town consists of an upper (residential) quarter and a lower (business) quarter. Its chief trade is derived from the great Penrhyn slate-quarries at Bethesda (q.v.). The slates are exported, and are also manufactured at Bangor into tables, chimney-pieces, &c. Penrhyn Castle and woods are near Bangor. Population, 11,200. Bangor unites with Carnarvon, &c., in sending one member to parliament. It is a place of great antiquity. In 525 St Deiniol founded a college here; and in 550 he became the first bishop; the cathedral founded by him was thrice destroyed, in 1071, in 1282, and in 1402. The present cruciform edifice, built between 1496 and 1532, was 'unequalled in meanness' amongst the cathedrals of the United Kingdom, until in 1869 Sir Gilbert Scott began to restore it, and it was reopened in 1880, much as it must have been in the 15th century. In 1883 Bangor received a municipal charter. The University College of North Wales, now a college of the University of Wales, was founded in 1884, and installed in a noble edifice opened in 1911; it has some twenty professorships, and Halls of Residence for Women and Men. Bangor contains several public schools and training colleges for teachers and ministers.

Bangor, a small seaport and watering-place in County Down, on the south side of the entrance to Belfast Lough, 12 miles ENE. of Belfast by rail. Pop. (1926) 13,316. St Comgall in 555 founded Bangor Abbey, which in the 9th century had 3000 inmates, and which forms the subject of an interesting monograph by the Rev. Charles Scott (2d ed. Belfast, 1887).

Bangor, a city and port in the state of Maine, 246 miles NE. of Boston by rail, on the Penobscot, about 60 miles from its mouth, and at its confluence with the Kenduskeag, which affords extensive water-power. At spring-tides, which here rise 17 feet, the harbour is accessible from the sea for the largest vessels, and as the navigation cannot go higher, Bangor is one of the largest lumber depôts in the world, absorbing and monopolising the trade of the heavily timbered basins of the Penobscot and its tributaries. About 200,000,000 feet of lumber are annually shipped from Bangor during the season of eight months. Bangor possesses a custom-house of granite, several churches, a theological seminary, foundries, planing and sawing mills, furniture factories, &c. Bangor has also some shipbuilding, and foreign and coasting trade. Under English rule the place was known as Kenduskeag; its present name was taken from the well-known psalm-tune, a favourite of one of its ministers, Seth Noble. It was incorporated as a city in 1834. Pop. (1870) 18,289; (1880) 16,856; (1900) 21,850; (1920) 25,978.

Bangorian Controversy. Dr Benjamin Hoadly, Bishop of Bangor, in a sermon preached before George I. in 1717 advanced opinions on the power of the church, by denying the authority of the church over the conscience. He thus drew on himself the fiercest opposition from the advocates of ecclesiastical authority, and provoked a long and keen controversy. In one month as many as seventy-four pamphlets were published on the subject. See HOADLY.

Bangor-iscoed ('Bangor below the Wood'), a Welsh village, beautifully situated, in a fertile and richly wooded country, on the right bank of the Dee, in a detached portion of Flintshire, adjoining the counties of Chester and Salop, 5 miles SE. of Wrexham. Pop. of township, about 600. It was once the seat of one of the largest monasteries in Britain, founded before 180 A.D., and containing 2400 monks in the time of St Augustine. To distinguish it from Bangor in Carnarvonshire it is sometimes called *Bangor in Maelor*, or *Bangor Monachorum*.

Bangsrings (*Tupaiidæ*), a family of arboreal insectivorous mammals, sometimes known as squirrel or tree shrews. There are two genera—Tupaia, with numerous species, of which the larger are 8 or 9 inches long; and Ptilocercus, with a single species, the Bornean pintail. They are all oriental animals, and range from the Khasia Hills in India, to Java and Borneo. The fur is soft and glistening, and a long bushy tail is generally present. They are restlessly active during the day, searching for insects and fruits. Two of the largest species are the Tana (*T. tana*), with a feathery tail, in one variety of a bright golden colour; and the Ferruginous Bangsring (*T. ferruginea*), widely distributed in the Malayan region. The soles of the feet in the latter are plaited like those of geckos, and give the animals a sure grip of a branch. See INSECTIVORA.

Bangweolo (also called Bemba), a great Central African lake, discovered by Livingstone in 1868, which is 150 miles long by 75 in width, and 3700 feet above the sea. The Chambese, which flows into it, and the Luapula which issues from it, constitute the head-stream of the Congo. The shores are flat, and parts of the lake are mere marsh. In the NW. part are four large islands, inhabited by the Mboghwa, a race of fishermen and herdsmen. On its south shore Livingstone died.

Banialuka, a town of Bosnia, picturesquely situated on the Vrbas, in a fine forest district, 40 miles ESE. of Novi. It is strongly fortified, and, besides some Roman remains, contains warm baths, numerous mosques, important powder-mills, and (1921) 16,413 inhabitants, of whom some two-thirds are Mussulmans.

Banian (from the Sansk. *vanij*, 'a merchant'), a member of a Hindu merchant-caste, most numerous in Bengal and the United Provinces of India. The name was originally applied more particularly to those from the province of Guzerat,

many of whom had settled early in Arabian ports for purposes of trade; but was frequently extended by early writers to all Hindus in Western India. This class, which numbers somewhere between 3,000,000 and 4,000,000 souls, carries on an extensive trade, by means of caravans, with the interior of Asia, even to the borders of Russia and China. Contrary to the general custom of the Indian people, these merchants travel much, and the establishments and counting-houses of Indian Banians are to be found in almost every commercial town of any note in Asia, whilst in Africa they were even at one time identified with the slave-trade. Generally speaking, those with sufficient capital subsist solely by money-lending, charging usurious rates of interest; the poorer classes open retail shops, or hawk their goods about the country villages. The members of the caste are mutually helpful, even advancing money to one another at reasonable interest.

Ban'ian-tree. See BANYAN.

Banim, JOHN, Irish novelist, born at Kilkenny in 1798, in 1813 went up to Dublin to study art, and two years later became a drawing-master in his native town. His youth was darkened by an unhappy love-affair; but having achieved some success as a playwright (1821), having married, and settled in London, he produced, in conjunction with his brother Michael (1796–1874), the *Tales of the O'Hara Family* (6 vols. 1825–26), which were followed by *The Croppy*, *The Denounced*, *The Smuggler*, *The Mayor of Windgap*, *Father Connell*, &c. In 1836 general sympathy having been attracted towards Banim's privations, occasioned by disease that precluded all literary exertion, a pension of £150 was awarded him, which was afterwards further increased by £40 for the education of his daughter, an only child. He died in poverty, 13th August 1842, at Windgap Cottage, near Kilkenny. Banim failed in his attempt to portray the manners and frivolities of the higher classes; but none of his predecessors succeeded in depicting so vividly and truly the Irish peasant. Although generally happy in the plot and development of his story, he is too much disposed to dwell on the horrible. His denunciations may be well founded, but they mar the poetic effect. Banim was also not quite free from a somewhat tiresome minuteness of description, and his imitation of Scott is frequently very palpable. See P. J. Murray's *Life of John Banim* (1857).

Banishment (the act of putting under *ban*, 'proclamation,' as an outlaw), the exclusion of the offender from native privileges and his abandonment to enemies and strangers, without 'supervision or the assignment of any precise place of abode.' Thus Scots criminals might be banished from Scotland. Under English law banishment of a subject beyond the seas was not a lawful punishment at common law except under the obsolete procedure of abjuring the realm. Sometimes it involved outlawry and loss of civil rights, sometimes not. In later English law the term was transferred to deportation or transportation with confinement. Transportation was originally introduced by giving pardon conditional on the convict's remaining in a colony for seven years and passing five of them in service. In the 18th century it became a statutory punishment for many felonies and some misdemeanours—e.g. perjury. By statute (20 & 21 Vict. c. 3) transportation under the sentence of a court was abolished, and penal servitude was substituted. The idea of banishment occurs in the ostracism of Greece, and the relegation, exile, and deportation of Rome. It was generally accompanied by forfeiture of civil rights. See OSTRACISM, OUTLAWRY, PRISONS.

Banjermassin', a former sultanate on the SE. of Borneo, with an area of 5928 sq. m., and a pop. of about 300,000, chiefly Mohammedans. Tributary to Holland since 1787, it was annexed on the death of the last sultan in 1857, and is now governed by the Dutch resident for the south and east of Borneo, who has an assistant at Martapura, where the sultans formerly lived. Banjermassin is watered by large rivers and intersected by a chain of mountains, in several parts rising to 3000 feet. Excellent small-arms are manufactured. The products are pepper, wax, edible nests, rattans, benzoin, dragons' blood, coal, iron, diamonds, and gold dust.

BANJERMASSIN, the capital of the residency, is built on the island of Tatas, about 15 miles from the mouth of the Banjer or Barito; pop. 65,000. The town is subject to frequent inundations, and the houses are raised on piles, most of the traffic being carried on in boats. The trade, which is considerable, is mostly in the hands of the Chinese, and the imports include piece-goods, gunpowder, opium, rice, sugar, salt, Chinese porcelain, silks, and a few horses from Java.

Banjo (originally a mere negro mispronunciation of *bandore*, derived through the medium of Spanish or Portuguese, from Lat. *pandura*, Gr. *pandoura*, a three-stringed musical instrument), an instrument of the guitar kind, played usually with the fingers. Ordinarily it has frets; a long neck; a body like a drum, of parchment stretched on a hoop, without a back; and five strings (one bound silk, two gut, two wire). It became known principally through its use by the coloured minstrels of the United States, a company of whom came to England in 1846. The 'zither-banjo' has a wooden back.

Banka, or BANGKA. See BANCA.

Banker-marks. See MASONS' MARKS.

Bank Holidays, as appointed by Lord Avebury's act of 1871, fall in England and Ireland on Easter Monday, Whit-Monday, the first Monday in August, and 26th December; in Scotland, on Christmas and New-year's Days, Good Friday, and the first Mondays of May and August.

Banking. The word 'bank' as connected with the business of banking is identical with *bank* in the sense of 'bench,' and ultimately cognate with *bank* in the sense of 'ridge of ground.' It is accordingly of Teutonic origin, but associated with the medieval Latin word *bancus*, meaning a bench and occasionally a counter. The word bank, as something supplied by several persons, occurs in Bacon's essay on Usury in the sentence, 'Let it be no bank or common stock,' referring to a proposal which would serve 'to invite moneyed men to lend to the merchants for the continuing and quickening of trade.' The business of banking has been carried on for many ages. Arnold in his *History of Rome*, speaking of the commissioners appointed for the relief of distressed debtors who wanted ready money for *bonâ fide* trade purposes by the consuls in the year 403 B.C., with the title of *mensarii*, or bankers, says: 'These established their banks or tables in the forum like ordinary bankers.' Private bankers were known of in Venice at least as soon as the 13th century. The trade began, as Professor Dunbar of Harvard University relates in his description of the Bank of Venice contained in his *Economic Essays*, 'as an adjunct of the business of the *campsores*, or dealers in foreign moneys. In a city having a great and varied trade with many countries, these dealers necessarily held an important place, close to the stream of payments which was constantly in motion. As early as 1270 it was deemed necessary to require them to give security to the government as the condition of carrying on their business, but it is

not shown that they were then receiving deposits.' Italy thus early took a leading place in the business. Mr F. G. Hilton Price, in his *Handbook of London Bankers*, gives in an extract from the state papers the petition of 'Cristofero Hagenbuch e Compagni' to Queen Elizabeth for authority to institute an office which would not only provide Her Majesty 'with whatever notable sum of money your Majesty may wish, but, by this means, your state and people also; and it shall keep the country in abundance and remove the extreme usuries which devour your Majesty and your people.' The petition is in Italian, and is endorsed by Francis Walsingham, 'The Office of a Banke.' Nothing came of this proposal or of several others somewhat similar in character which are chronicled by Mr Price down to the time of King Charles II. Gradually the business of banking was developed by the goldsmiths of London, who are described in the *Little London Directory* of 1677 as keeping 'running cashes,' and who thus commenced the business before the opening of the Bank of England, founded in 1694. The expression 'running cashes' had been in use some fifty years at this time (Anderson's *History of Commerce*, vol. ii. p. 402). Up to the year 1640 the Royal Mint in the Tower of London had been made use of as a kind of bank or place of deposit for merchants to lodge their cash within in safety. The action of King Charles I. in seizing the cash in the Mint caused an alteration in this respect. The result is best narrated in Anderson's words: 'The merchants and traders of London generally trusted their cash with servants, until the breaking out of the civil war, when it was very customary for their apprentices and clerks to leave their masters and go into the army. Whereupon, in such unsettled times, merchants, not longer daring to confide in their apprentices, began first, about this year 1645, to lodge their necessary cash in goldsmiths' hands, both to receive and pay for them, until which time the whole and proper business of London goldsmiths was to buy and sell plate, and foreign coins of gold and silver, to melt and cull them, to coin some at the Mint, and with the rest to supply the refiners, plate-makers, and merchants, as they find the price to vary. This account of the matter we have from a scarce and most curious small pamphlet, published in the year 1676, entitled *The Mystery of the new-fashioned Goldsmiths or Bankers discovered*, in only eight quarto pages. Our said author further observes "that this new banking business soon grew very considerable. It happened," says he, "in those times of civil commotion, that the parliament, out of the plate, and from the old coin brought into the mint, coined seven millions into half-crowns; and there being no mills then in use at the mint, this new money was of very unequal weight, sometimes twopence and threepence difference in an ounce; and most of it was, it seems, heavier than it ought to have been, in proportion to the value in foreign parts. Of this the goldsmiths made naturally the advantages usual in such cases, by picking out or culling the heaviest, and melting them down, and exporting them. It happened, also, that our gold coins were too weighty, and of these also they took the like advantage.

"'Moreover, such merchants' servants as still keep their masters' running cash, had fallen into a way of clandestinely lending the same to the goldsmiths, at fourpence per cent. per diem; who by these and such-like means were enabled to lend out great quantities of cash to necessitous merchants and others, weekly or monthly, at high interest; and also began to discount the merchants' bills at the like or an higher rate of interest. That, much about the same time, they [the goldsmiths or new-fashioned bankers] began to receive the rents of gentlemen's estates, remitted to town, and to allow them and others, who put cash into their hands, some interest for it, if it remained but for a single month in their hands, or even a lesser time. This was a great allurement for people to put their money into their hands, which would bear interest till the day they wanted it [somewhat like our English East India Company's bonds]. And they could also draw it out by one hundred pounds, or fifty pounds, &c., at a time, as they wanted it, with infinitely less trouble than if they had lent it out on either real or personal security. The consequence was that it quickly brought a great quantity of cash into their hands"' (Anderson's *History of Commerce*, vol. ii. pp. 402–3).

The system of banking as practised at the present time—that is, of keeping an account with a banker into which available ready money may be paid, and from which any amounts that are required may be drawn out by means of cheques—gradually grew out of the habit described, and followed on the early system by which the notes of a banker were accepted generally through the personal confidence which was placed in him. 'The term banking was then applied only to the issue of notes and the taking up of money on bills on demand' (Bagehot, *Lombard Street*, p. 98). This was the earlier system, and the great convenience it was to persons of all classes promoted and encouraged its existence. The circulating medium of the country during the 18th and the early part of the 19th century to a large extent consisted of notes. The carrying on the business of banking was, at its origin in the United Kingdom, intimately connected with the power of issuing notes. It is clear from the act of 1742 referring to the Bank of England that parliament understood by 'banking' only the issue of notes. In early days the resources of a bank in the way of its note circulation were very much greater than those derived from the deposits of its customers. The accounts of the Bank of Dundee, which commenced operations in 1764, are in accordance with this, and show that the Bank of Dundee did not begin to receive deposits till the year 1792, in which year they amounted to £35,944, with a note circulation of about £50,000.

Adam Smith, whose life extended from 1723 to 1790, saw the first commencement of banking in the modern sense in the United Kingdom. The references to banks of deposit which Adam Smith makes in the *Wealth of Nations*, and particularly concerning the Bank of Amsterdam, are connected with a banking system of an entirely different class from that which exists in the United Kingdom, or indeed in commercial Europe, at the present time, and which derived its origin from the conditions of the current coin in the great trading nations of that period. Adam Smith describes the position of matters in these respects as follows: 'The currency of a great state such as France or England generally consists almost entirely of its own coin. . . . But the currency of a small state such as Genoa or Hamburg can seldom consist altogether in its own coin, but must be made up, in a great measure, of the coins of all the neighbouring states with which its inhabitants have a continual intercourse.' A currency of this class was naturally very inconvenient to the merchants who had to meet the demands continually made on them. To enable this to be done the Bank of Amsterdam, which city was then one of the largest centres of foreign trade, was established. Adam Smith says: 'It is generally reckoned that about 2000 persons kept accounts with the bank;' while Oudermeulen, in *Bankwezen*, quoted by Dunbar, estimated the number at 5000. These all obtained the use of 'bank money,' which really represented a credit in the books of the bank granted against coin which had been deposited

there, and with this 'bank money' were able to pay the bills that were drawn upon them. For the privilege of using this currency a regular charge was made on all the holders of accounts, the charge being naturally higher on the small transactions, which caused equal or possibly more labour to the bank, and were less remunerative to it. Adam Smith's description of the operations of the Bank of Amsterdam is the most complete of any contemporary statement on the subject. The bank was established in 1609 under the guarantee of the city, which derived a considerable revenue from it. Having contributed for more than two centuries greatly to the prosperity of Amsterdam, the bank was wound up after the French invasion of Holland towards the end of the 18th century.

The last survivor of the institutions of this description was the Bank of Hamburg, the business of which came to an end in February 1873, when the establishment of the empire of Germany and the institution of a uniform currency over the whole of that country, in conjunction with the general improvement of the coinage current in Europe, removed the necessity for such institutions. These banks of deposit, besides providing a recognised currency for the payment of foreign bills of exchange, were of service by economising the use of the circulating medium. This was done upon the principle of transfer. The principle of transfer was one of the first which was brought into operation in modern banking, and it is put into practice daily every time a cheque is drawn which is placed to the credit of the person to whom the money belongs, either at the same or at another bank. The amount of money in the banks remains the same, but the ownership is altered.

Besides the reference to these institutions in the *Wealth of Nations*, there is the well-known passage in the volume referring to banking: 'The only trades which it seems possible for a joint-stock company to carry on successfully without an exclusive privilege are those of which all the operations are capable of being reduced to what is called a routine, or to such uniformity of method as admits of little or no variation. Of this kind is, first, the banking trade. . . . Though the principles of the banking trade may appear somewhat abstruse, the practice is capable of being reduced to strict rules.' The experience of considerably more than a century has shown the truth of this remark, but it was long before the law of England permitted the suggestion to be put into practice. With the one exception of the Bank of England, banking in England, Wales, and Ireland was for many years after Adam Smith wrote conducted only by one form of banks—private banks, which consisted of firms with not more than six partners, and having the power, which they generally exercised, of issuing notes.

The difficulties experienced in carrying on business about the middle of the 18th century through the absence of a generally acceptable circulating medium is incidentally shown by a transaction mentioned in a letter written by the great-grandfather of the present writer, Mr James Turner, who established the bank at Great Yarmouth in partnership with the Gurneys in 1781. This letter, written 30th September 1774, referring to a sale of land for which the sellers had taken 'the deposit money in notes,' continues: 'That the vendors cannot' accept the payment for it 'in bank or bankers' notes, as turning the same into cash at that time of year will be attended with a great expence.' The date when the payment became due was 24th December, and a suggestion was accordingly made that a bill should be drawn for the balance due—about £2000—as this would save 'the risque and expence of sending down that sum.'

The Note Issues in England.—During the 18th century and for a considerable part of the 19th, as was mentioned in reference to the establishment of the Bank of England, the business of banking in England outside the metropolis, and even to a great extent in London, consisted to a great degree in the issue of notes. The issuing banks were very numerous, and large transactions were carried out through the notes. The total amount was undoubtedly large, but few trustworthy statements of the amounts of the actual circulation have been preserved. The following figures from *Marshall's Digest* (printed by recommendation of the Select Committee of the House of Commons on Public Documents, 1st March 1833) give some idea of the position of matters in England and Wales:

	Note Circulation.		
	Bank of England.	Country Bankers.	Total.
1814	£27,000,000	£23,000,000	£50,000,000
1820	24,500,000	10,500,000	35,000,000
1830	20,000,000	7,600,000	28,100,000

From 1805 to 1825 the private deposits in the Bank of England did not exceed two millions, and were rarely more than one. In 1828 they reached five millions for the first time. These figures give us a fair idea of the position of banking at that period. The estimates of the amount of the note circulation down to the year 1844 vary greatly from each other, and besides those preserved in *Marshall's Digest* there is no general statement which can be depended on. Sir Robert Peel, by his Bank Act of 1844, required the particulars to be published. By that date the deposits of banks had begun to increase and cheques to take the place of notes, which accordingly became of less importance. The number of the note-issuing banks in England and Wales has greatly diminished during the last few years. Of a fixed issue allowed by the Bank Act of 1844 (carried by Sir Robert Peel) amounting to £8,631,647 divided between

207 private banks	£5,153,417
72 joint-stock banks	3,478,230
	£8,631,647

only £669,480 remained in 1911 in the hands of

10 private banks	£423,749
7 joint-stock banks	245,731
	£669,480

with an issue of about £160,000 notes in actual circulation. The loss of the note issue has been a great disadvantage to banking in England and Wales. It would be an easy thing to arrange a plan which would provide complete security for such a circulation, which should not include notes of a lower value than £5. In Scotland the limit of £3,087,209 possessed by nineteen banks in 1844 is now reduced to £2,676,350 possessed by eight banks. In Ireland the fixed issue of £6,354,494 possessed by six banks in 1844 remains altogether unaltered. The actual note circulation in 1911 was about £7,000,000 in Scotland, and rather more than £7,600,000 in Ireland. In England and Wales the notes issued by the Bank of England, which are practically the only notes used there, averaged some £29,000,000 in 1911. By far the greater part of the circulating medium of the United Kingdom, except in some degree in Ireland and in a greater degree in Scotland, now consists of cheques—that is, of entries in the ledgers of banks—with the use of specie, gold coin, silver, and bronze, for amounts below 20s., and not even for all of these, as the use of cheques for very small sums increases continually.

The privilege which the Bank of England possessed of being the sole bank on the joint-stock principle (with limitation of the liability of the holders of its stock to the amounts they had subscribed) prevented the establishment of any other joint-stock bank in England and Wales up to the year 1826, when 'an act of parliament was

passed to permit the formation of banks having more than six partners at a greater distance than 65 miles from London, with a provision, however, that such banks should not make their notes payable in London, nor draw bills upon London for a less amount than £50' (Gilbart's *History and Principles of Banking*). Under this act a good many joint-stock banks, of which the Lancaster Banking Company, founded October 23, 1826, (amalgamated with the Manchester and Liverpool District Banking Company, Limited, 1907), was the earliest, were established. The act of 1833 carried this permission a step further, and allowed the establishment of joint-stock banks—banks with more than six partners—in London itself (Memorandum of Sir Henry Thring in Appendix to Report from the Select Committee of the House of Commons on Banks of Issue, 1875). The London and Westminster Bank, established 1834, was the first joint-stock bank founded in London. Since that time the application of the joint-stock principle has greatly extended. No new private bank has been established for many years, and nearly all those which were in existence had by 1911 amalgamated with joint-stock banks. The limitation of the liability of the shareholders to the amount of their subscription was not permitted till the failure of the City of Glasgow Bank and the Western Bank of Scotland in the year 1878 called attention to the subject, and the act of 1879 was passed by the intervention of Sir Stafford Northcote, afterwards Earl of Iddesleigh. In 1912 practically all the joint-stock banks of the United Kingdom were 'limited.'

In Scotland different laws prevailed, and joint-stock banks were established far earlier than in England. The stability of the system in Scotland was greatly promoted by the provision of the law which declared that 'there is no limitation upon the number of partners of which a banking company may consist' (Report of the Committee of the House of Commons appointed in 1826 to consider the expediency of abolishing all notes under £5). The oldest of the Scottish banks is the Bank of Scotland, which dates from 1695. Other joint-stock banks followed gradually. All the private banks, some of which were of very high standing, had ceased business by 1844. The numbers of the joint-stock banks have during the last hundred years or so greatly diminished through amalgamations. In 1819 there were thirty-six separate banks in Scotland, including eight private banks. In 1911 there were only ten banks, eight possessing the right of issue, all on the joint-stock principle. In Scotland the establishment of branches, not only in small towns, but even in villages, has been carried out more extensively than in England. The power of issuing notes which provide 'till money' economically has greatly assisted in this.

The acts of 1844–45 permit the banks which have the privilege of the note circulation in Scotland and Ireland to issue notes beyond the limit fixed by those acts, provided they hold specie—principally gold coin—to a corresponding amount. A certain latitude in time is allowed the banks to obtain the specie which has to be held in Scotland and Ireland. The Scottish banks are frequently £4,000,000 or £4,500,000, and the Irish banks about £1,000,000, above their limits. The specie held is not specially ear-marked as security for the excess issue. It is required, in pursuance of the theory on which Peel's bank acts were based, that the issue of notes affected prices, a theory at no time tenable, and now absolutely out of date.

The law regulating banking in Ireland has corresponded very closely with that in force in England. There are two private banks now in Dublin, and nine joint-stock banks carrying on business generally in Ireland. All these banks except three are banks of issue, and all except the Bank of Ireland, founded in 1783, have been established since 1824. It speaks well for the careful management of the business that in Ireland alone, out of the three divisions of the country created by Peel's acts of 1844–45, has the limit for the note circulation remained unaltered. The arrangements for the note circulation are in their main features similar to those in force in Scotland.

A very well-arranged banking-system exists in Canada. The law governing the circulation of notes secures their being paid in hard cash not only at the bank itself and its branches, but also in important representative cities of the Dominion, as Toronto, Montreal, Halifax, and others. Their security is maintained by their not being allowed, in a general way, to exceed the amount of the unimpaired paid-up capital, by their being made a first charge on the assets of the bank, by the liability of each shareholder for double the amount of his holding, and, further, by a guarantee fund called the 'circulation fund,' which each bank has to maintain. This guarantee is collective from all the issuing banks of the Dominion. Secured thus, the notes of all the chartered banks pass regularly, at par, throughout the whole of Canada. The system has been of the greatest service in the development of the country. As a rule a manufacturer, a merchant, or a dealer in produce keeps his account with only one bank. There are great advantages in this. The banker is able not only to form a better judgment about the advances which his customer may require, but to give his customer sound advice on the subject of his business, which is especially useful in a country with wide fields for enterprise and at present imperfectly developed.

The National Bank of Belgium exercises a powerful influence on the business of the kingdom. Its agencies (country offices) are 'institutions so peculiar in character that an explanation is advisable. They are private partnerships—*sociétés en nom collectif*, "the title of the firms comprising the name of one or more of the partners, and the liability of each being unlimited." (See article on "Sociétés Commerciales" in Palgrave's *Dictionary of Political Economy*.) The members, or administrators, of these firms are approved by the bank. They are responsible for the due payment of the bills discounted by them. They do a large business.'

The banking laws of the United States prohibit the establishment of offices, other than the head-office of a bank, except within the limits of the municipality. This explains the great number of banks in that country. See also CLEARING-HOUSE, SAVINGS-BANKS.

Bankipur, or PATNA CIVIL STATION, a suburb of Patna (q.v.).

Bankruptcy, or INSOLVENCY, is the state of a person who is declared by the competent tribunal unable to pay his debts. There is no common law of bankruptcy in England, the whole law upon the subject being statutory. In England insolvency is a term which had, until the distinction was abolished in 1861, been confined to the case of a non-trader who was unable to pay his debts. All who were 'traders' were said in the same circumstances to be, not insolvent, but bankrupt. Different courts, called the Bankruptcy and the Insolvent Courts, were concerned respectively with these two great divisions of mankind, traders and non-traders. In the case of traders, the Court of Bankruptcy was the court to which they or their creditors applied. That court, whenever a trader committed an 'act of bankruptcy,' on the application of a creditor took possession of his pro-

perty and assets of every kind, converted these into money, and distributed the proceeds impartially among the creditors, according to certain rules, at the joint expense of the creditors. In the course of doing this, the court required the bankrupt to state what property he had, where it was, and to give explanation of what had been lately lost; and it was a crime for him to conceal or make away with any part of his property to the prejudice of an impartial distribution. The creditors had to show their title to a share by 'proving' their debts. In this way the debtor was entirely stripped of everything (with a few trifling exceptions) which he had, and which was saleable; but he then received a certificate which entirely cleared him of the encumbrance of his past debts for ever, and enabled him to begin the world anew.

The non-traders fell under the care of the Insolvent Court. These petitioned the court voluntarily, instead of their creditors doing so, as in the Bankruptcy Court, and of course put off their application to the last, when they were probably already in prison for debt. The sole condition on which the Insolvent Court granted them its protection and discharged them from prison was that they should not only give up all their property, but state fully all the debts and liabilities they had incurred. If they did this satisfactorily, the court relieved them from imprisonment, but did not entirely free them from debt; for if ever they should in future become rich enough to pay twenty shillings in the pound, they were still held liable to make up that amount. This contingency, however, seldom happened, and, moreover, when it did happen, considerable leniency was shown to the debtor; so that practically both in bankruptcy and insolvency the debtor was discharged, and was at least saved from imprisonment.

The bankruptcy laws date from the time of Henry VIII., and the insolvency laws from the time of Elizabeth, and the above distinction was kept up between them till the statute of 1861, which abolished the Insolvent Court. Important changes were made by the act of 1869, which repealed prior enactments and rendered the law more uniform, by applying it equally to traders and non-traders. The act of 1869 was repealed by the Bankruptcy Act, 1883, and this in its turn, after being amended by the Bankruptcy Act, 1890, the Bankruptcy and Deeds of Arrangement Act, 1913, and certain other statutes of lesser importance, was repealed by the Bankruptcy Act, 1914, which, together with the bankruptcy rules made by the Lord Chancellor under the authority given for that purpose by the act, now forms the English code upon the subject.

As the law now stands, the High Court is the Court of Bankruptcy for the metropolitan district, a High Court judge being nominated by the Lord Chancellor to take bankruptcy business. Outside London, the County Court judges exercise bankruptcy jurisdiction in their various districts. An appeal lies in bankruptcy matters from the High Court to the Court of Appeal, and thence, with leave, to the House of Lords. From the County Courts the appeal is to a Divisional Court of the High Court, and thence, with leave, to the Court of Appeal, but no farther. The bankruptcy registrars (whose duties outside London are performed by the County Court registrars, in addition to their other functions) occupy an important position in bankruptcy administration. They hear petitions, make adjudications in bankruptcy, hear the public examination of the bankrupt, and in London approve compositions and grant discharges; in the County Court these last two functions can only be performed by the registrar when there is no opposition from creditors or other persons. Over the whole of the bankruptcy administration the Board of Trade exercises a general superintendence, and presents annually to parliament a report and statistics which cover the whole field of the subject.

The 'debtor' who may be made bankrupt under the act of 1914 includes any person, whether a British subject or not, who at the time when any 'act of bankruptcy' was done or suffered by him (*a*) was personally present in England, (*b*) ordinarily resided in England, (*c*) was carrying on business in England, personally or through an agent or manager, or (*d*) was a member of a firm or partnership carrying on business in England. Under the act of 1883 a foreigner could only be made bankrupt in respect of acts committed in England; nor could a principal abroad be made bankrupt by reason of an act of bankruptcy committed in England by his agent or manager. Special rules still apply to certain classes of debtors. A married woman can only be made bankrupt if she carries on a trade or business; but it is no longer necessary that she should carry it on separately from her husband. An infant, whose contracts are not, as a rule, binding on him, cannot be made bankrupt in respect of liabilities incurred on such contracts; where, however, the contract is binding (such as a contract for the supply of necessaries), there seems to be no reason for granting the infant exceptional treatment. The better opinion is that a lunatic can be made a bankrupt; so also can a convict who is undergoing imprisonment. There are special rules in the Companies Acts relating to the winding up of limited companies; but an ordinary partnership comes under the general law, as does also a limited partnership, subject to any modifications which may be made by rules under the act.

The acts or defaults which render a debtor liable to be made bankrupt are called technically 'acts of bankruptcy.' These are (1) assignment of property to trustees for the benefit of creditors; (2) fraudulent assignment of property; (3) fraudulent preference of creditors; (4) departing from England, remaining abroad, or keeping house with intent to delay or defeat creditors; (5) suffering an execution to be levied on his goods; (6) presentation of a bankruptcy petition by the debtor against himself; (7) non-compliance with the requirements of a bankruptcy notice; (8) notice to creditors that he is, or is about to become, insolvent. A debtor is also deemed to have committed an act of bankruptcy when a judgment creditor applies for his committal to prison for non-payment of a judgment debt, and the court, in lieu of committal and with the consent of the creditor, makes a receiving order against him. Of all these acts, non-compliance with the requirements of a bankruptcy notice is the commonest foundation for a petition, because a creditor may in that case himself compel the commission of the act of bankruptcy, and so force the debtor to become bankrupt. A bankruptcy notice is a notice which requires the debtor to pay a judgment debt within a specified period, and failure to pay or compound to the creditor's satisfaction constitutes an act of bankruptcy, of which any creditor may take advantage.

A creditor cannot present a bankruptcy petition against a debtor unless (*a*) the debt, or, if two or more creditors join in the petition, the aggregate amount of debts owing to the several petitioning creditors, amounts to £50; (*b*) the debt is a liquidated sum; (*c*) the act of bankruptcy alleged occurred within three months of the presentation of the petition; and (*d*) the debtor is domiciled in England, or within the preceding year has ordinarily resided or had a dwelling-house or place of business in England, or (except in the case of a person domiciled in Scotland or Ireland, or a partnership with its principal place of business in Scotland or Ireland)

has carried on business in England, personally or through an agent or manager, or (with the same exceptions) has been within that period a member of a partnership carrying on business in England through a partner, agent, or manager. The petition must be verified by affidavit. A secured creditor must state his willingness to give up his security for the benefit of the creditors at large, or he must estimate its value and petition in respect of the unsecured balance only. A petition once presented can only be withdrawn by leave of the court. The court has a general discretion in granting the petition, and will not necessarily do so, even should the creditor duly prove his debt, if for any reason it appears that the proceedings are not *bona fide*, or that bankruptcy will result in no appreciable benefit either to debtor or to creditors. If, however, there is no ground for departing from the usual course, a 'receiving order' is made, the effect of which is to put the official receiver temporarily into possession of the debtor's estate pending a final adjudication. The debtor then files a statement of his assets and liabilities, and has to submit himself to a public examination, at which he may be questioned, not only by the official receiver, but by any creditor. Within a short period of the receiving order, the creditors meet and decide whether they shall make the debtor bankrupt or accept any scheme of arrangement which he may put before them. The latter requires the consent of a majority in number and of three-quarters in value of the creditors and also the approval of the court, which in certain cases cannot be given unless the conditions specified in the acts are fulfilled, and can in no case be claimed as of right. A receiving order may be rescinded if the court is satisfied that the case can be more conveniently dealt with by Scottish or Irish bankruptcy proceedings or for other good cause—for example, if the debtor pays his debts in full.

If the creditors decide upon bankruptcy, the debtor is forthwith adjudicated bankrupt, and the same result follows if the creditors either do not meet or pass no resolution at their meeting. The official receiver then becomes trustee of the assets, and therefore legal owner of them, until such time as the creditors appoint a trustee. Failing appointment by the creditors, a trustee is selected by the Board of Trade, who commonly appoint the official receiver. A trustee appointed by creditors gives security to the satisfaction of the Board of Trade, and may be advised by a committee of inspection, also appointed by the creditors, usually from among their own number. Certain powers of the trustee cannot be exercised without the consent of this committee, or, if no committee has been appointed, of the Board of Trade. The trustee may be removed by resolution of the creditors, or, in the event of misconduct or physical incapacity, by the Board of Trade. He is remunerated by commission on assets realised and dividends paid, and is entitled to an indemnity out of the estate for his proper expenses. All moneys received by the trustee are to be paid into the bankruptcy estates account at the Bank of England; though, with the permission of the committee of inspection and of the Board of Trade, an account may also be opened at a local bank.

All property of the bankrupt which he had at the date of bankruptcy or acquired at any time before his discharge vests, as a general rule, in the trustee, except trust property, the tools of the debtor's trade, and bedding and wearing-apparel of himself and his family to the amount of £20. But a bankrupt who disposes of after-aquired property to another person for value can give a good title, provided the transferee had no knowledge of any claim by the trustee; the transferee being in such a case protected against a subsequent demand from the trustee. Nor do the personal earnings of the bankrupt pass to his trustee, or damages awarded the bankrupt in respect of a personal tort—e.g. a libel published concerning him. The court may, however, require the debtor to set aside a certain portion of his earnings for the benefit of his creditors. In the event of a second or subsequent receiving order being made against the same bankrupt, any property acquired by him since the last adjudication which has not actually been distributed among the creditors vests in the trustee in the subsequent bankruptcy, debts still unsatisfied under the former bankruptcy being provable by the trustee in the subsequent proceedings. But apart from these exceptions, the trustee can claim the whole of the debtor's property of every kind, whether real or personal. His rights in this respect are, moreover, enlarged by reason of the doctrine of 'relation back.' His title is held not to begin with the bankruptcy, but to relate back to the date of the first act of bankruptcy occurring within three months of the presentation of the petition. Fraudulent dispositions by a bankrupt on the eve of bankruptcy are thus nullified, because the transferee (unless he had no knowledge of any available act of bankruptcy) has no answer to the claim of the trustee to the property assigned, in the event of bankruptcy ensuing. The trustee can also take steps to get set aside certain other transactions by the debtor. Assignments in fraud of creditors are void against the trustee (subject to the rights of *bona fide* purchasers for value), and so also are assignments which constitute a fraudulent preference of one creditor over another. Voluntary settlements within two years of bankruptcy are similarly void, and even within ten years, unless in the latter case it can be shown that the bankrupt was fully solvent at the time when the settlement was made. In one case goods which do not belong to the bankrupt at all may nevertheless pass to his trustee—viz. goods which are in the 'possession, order, or disposition' of the bankrupt, in his trade or business, with the consent of the true owner, in such circumstances that the bankrupt is the 'reputed owner' of them. The object is to prevent a trader obtaining credit on the strength of goods which do not in fact belong to him; and the true owner of the goods who enables credit to be so obtained must be taken to know the risk which he runs by giving the trader possession of them.

With regard to the claims of creditors against the debtor's estate, the rule is that every liability of the debtor is provable, except a demand for unliquidated damages not founded on contract or breach of trust. Where there have been mutual dealings between a creditor and the debtor, the former may only prove for the balance of account. The trustee has the right, however, to disclaim property to which onerous burdens are attached—such as shares not fully paid, leaseholds, or contracts likely to result in loss. Parties prejudiced by such action on the part of the trustee may prove for their loss with the other creditors. Disclaimer must take place within twelve months of the trustee's appointment, unless any person interested in the property calls upon the trustee to decide whether he will disclaim or not; in which case the trustee must make up his mind in twenty-eight days. Certain debts must be paid preferentially; among these are rates and taxes, Insurance Act contributions, payments not exceeding £100 under the Workmen's Compensation Act, and wages of clerks, servants, and workmen, for a period and amount not exceeding four months and £50 respectively. On the other hand, a wife who lends money to her husband for the purposes of his trade can only prove after the claims of all other creditors for value have been satisfied. Secured creditors may

either content themselves solely with their security, or may prove for the deficiency of their debt over the value of the security, or may give up their security and prove for the whole debt. If a secured creditor puts a value on his security and proves for the balance, the trustee may redeem for the amount at which the creditor has estimated the value.

The first dividend is to be paid within four months of the first meeting of creditors, and subsequent dividends at intervals of not more than six months. The bankrupt is bound throughout the administration to assist in every way the discovery and realisation of his property, and he may be arrested if there is reason to believe that he is going to defeat these main objects of the bankruptcy. The court has also power to examine any one suspected of having the debtor's property, or being indebted to him, or of being able to give information about the estate.

The bankrupt may at any time after adjudication apply for his 'discharge;' and it may here be observed that, apart from this, the court has at all times, on sufficient cause being shown, the power to annul altogether any adjudication; though this is not often done. A 'discharge' operates as a release of the bankrupt from substantially all his liabilities, and enables him to begin again with a clean sheet. Liabilities, however, in respect of debts due to the Crown (unless the Treasury consent), or in respect of fraud or fraudulent breach of trust, or under a judgment as co-respondent in a divorce suit or in an action for seduction, or under an affiliation order, are not released by a discharge. In certain cases a discharge must be refused—e.g. if the bankrupt is guilty of any criminal offence (of which a variety have been created by the Bankruptcy Acts) in connection with the bankruptcy or the conduct of his business during the period immediately preceding it; in others the court is bound to impose conditions, if it does not refuse the discharge altogether. This is the case where the assets are not equal to ten shillings in the pound (unless the bankruptcy is wholly due to misfortunes beyond the debtor's control), or proper books of account have not been kept, or bankruptcy has been caused by hazardous speculation. It is a common practice in such circumstances to suspend the discharge for a period of years, or to make it conditional on the bankrupt consenting to judgment being entered against him for a certain sum. An undischarged bankrupt who obtains credit for more than £10, or engages in any trade or business under a name other than that under which he was adjudicated bankrupt, without disclosing the fact of his bankruptcy is guilty of a misdemeanour. With regard to offences which the investigation of the bankrupt's affairs shows that he has apparently committed, all bankruptcy courts have power to commit the bankrupt for trial. Statements made by the bankrupt in the course of his public examination are admissible in evidence against him upon his trial for such offences.

Bankruptcy operates as a disqualification for public offices of all kinds. No bankrupt may sit or vote in either House of Parliament, and a seat in the House of Commons is vacated six months after adjudication, unless the court certify that the bankruptcy was due to misfortune only and not to any misconduct on the bankrupt's part. So also no bankrupt can sit on any local council, or hold office as mayor or alderman, or be made a justice of the peace. Discharge releases the bankrupt from these disqualifications if the bankruptcy is certified to be due to misfortune; in other cases it continues to exist for five years.

The act of 1914 also contains important provisions in regard to small bankruptcies, where the property of the debtor is not likely to exceed £300. In such cases the official receiver becomes trustee; there is no committee of inspection, and the procedure is more summary. And where judgment has been obtained in the County Court against a debtor who is unable to pay the judgment debt, but whose total indebtedness is less than £50, the County Court may administer his estate and make an order for payment for his debts by instalments. The act also provides for the administration in bankruptcy of the estates of persons dying insolvent, which could formerly only be carried out by a suit in Chancery. The Chancery Court may now transfer to the Court of Bankruptcy all proceedings for administration which have already been begun in Chancery, or proceedings may be begun in the Court of Bankruptcy in the first instance. Substantially, the administration is upon the lines already described, with the necessary adaptations; but no proof of an act of bankruptcy committed by the deceased within three months of his death is necessary. It is sufficient if the court is satisfied that there is no reasonable probability of the estate being able to discharge its liabilities.

It is sometimes more advantageous and convenient for creditors to accept an assignment of the debtor's property or to make a composition with him without recourse to bankruptcy proceedings. Such arrangements are dealt with by the Deeds of Arrangement Act, 1914, which consolidates earlier enactments on the subject. Provision is made by the act for the protection of dissentient creditors, who are given the option of deciding within a certain period whether they will force a bankruptcy. The deed of arrangement must be registered in order to be valid. The trustee must give security to the court, and is generally subject to the supervision of the court and the Board of Trade in his management and distribution of the debtor's assets for the benefit of the creditors.

In Ireland the code of bankruptcy differs largely from that in England and Scotland. It consists of the Irish Bankrupt or Insolvent Act, 1857; the Debtors (Ireland) Act, 1872; the Bankruptcy (Ireland) Amendment Act, 1872; and the Local Bankruptcy (Ireland) Act, 1888. The first of these statutes contains 410 sections and 26 schedules, which were largely modified in 1872. The general principle is that of adjudication in the Court of Bankruptcy, the estate being taken by official assignees, who act along with an assignee afterwards appointed by the creditors, and are paid by a percentage on realisation. Since 1872 the law is applicable to traders and non-traders alike. In 1888 local bankruptcy courts were created, which administer bankrupt estates in substantially the same way as the High Court. In all cases compositions may be sanctioned by three-fifths in number and value of the creditors, and under the act of 1872 winding up by a trustee and committee of inspection was introduced. Imprisonment for debt was abolished in 1872, and new provisions introduced for the punishment of fraudulent debtors.

The creation of the Irish Free State involves the establishment of separate bankruptcy jurisdictions in Northern and Southern Ireland, and the Parliaments of the Free State and of Northern Ireland will in future each have power to legislate in bankruptcy matters.

It is to be observed that the Bankruptcy Act, 1883, requires that all English, Scottish, and Irish bankruptcy courts are to execute the orders of one another, and all British courts, whether in the United Kingdom or elsewhere, which exercise bankruptcy jurisdiction are to act in aid of, and auxiliary to, each other. Proceedings in England may also be dismissed or stayed if it appear that it would be more convenient that the bankruptcy administration should take place in Scotland or Ireland.

In Scotland the estate of a bankrupt is realised and distributed among his creditors in a process of sequestration. Where the estate is small, it is wound up by a process of 'summary sequestration,' which has been substituted for the former process, known as *cessio bonorum*. From the time that a debtor becomes insolvent—i.e. unable to pay his debts in full—the common law seeks to protect the interests of his creditors by imposing checks on his power of dealing with his property. These common law checks are rendered more effective by the act 1621, c. 18, which strikes at alienations of his property by an insolvent debtor, without onerous consideration, to near relatives or persons standing to him in a confidential relation; and by the act 1696, c. 5, which renders void voluntary dispositions of property by a debtor in favour of creditors for their satisfaction or further security, granted within sixty days of his becoming 'notour bankrupt.' The state of notour bankruptcy exists from the time that a person's insolvency is publicly known by reason of certain proceedings corresponding to what are called in England acts of bankruptcy. A debtor in this position is liable to sequestration, ordinary or summary, at the instance of his creditors.

The process of sequestration, which is regulated by the Bankruptcy (Scotland) Act, 1913 (3 & 4 Geo. V. c. 20), which came into operation on January 1, 1914, is similar in most respects to the corresponding process in England; but there are some differences of no small importance. The first step is a petition for sequestration, which may be presented either in the Court of Session or in the Sheriff Court. The petition may be presented by the debtor himself, with the concurrence of creditors; or, if the debtor is notour bankrupt, by one or more creditors whose debt or debts together amount to not less than £50, provided such debts are not contingent. The ordinary—not the summary—process of sequestration is also available where a person has died insolvent, and in that case the application may be made either by creditors in debts of the amount above mentioned, or by some one whom the deceased had authorised to apply. The deliverance awarding sequestration appoints a meeting of creditors for the election of a trustee, and, pending that election, the court has power to take measures for the preservation of the debtor's estate by the appointment of a judicial factor or otherwise. The trustee's election is confirmed by the Sheriff, who issues a statutory order, known as the 'act and warrant,' which constitutes the trustee's title to the sequestrated estate, and has the effect of divesting the bankrupt of all property, heritable or movable, in which he has a beneficial interest, and vesting it in the trustee. The creditors also elect commissioners, who advise and assist the trustee in the management of the estate and fix his remuneration. It is the duty of the bankrupt to produce a full statement of his affairs, to appear for public examination in the Sheriff Court, and to grant any deeds necessary for the recovery and realisation of the estate. To entitle a creditor to vote, or to draw a dividend, he must produce an oath or affidavit to the verity of his debt, and the account and vouchers necessary to prove it. These claims are adjudicated on by the trustee, who pronounces a deliverance in writing on each claim, rejecting, admitting, or requiring further evidence in support of it. A claim may be ranked as preferable, or ordinary, or contingent, or postponed. Domestic servants have a preference for their wages for the term current at the date of sequestration; clerks, shopmen, and other servants, to the extent of four months' wages; and workmen, to the extent of two months' wages. The bankrupt, on obtaining a report by the trustee on his conduct, may apply to the court for his discharge in the course of the sequestration at various periods, dependent on the proportion of creditors who concur. The court may refuse the application if the bankrupt has fraudulently concealed any part of his property or wilfully failed to comply with any of his statutory duties; and where less than 5s. in the £1 has been paid, a discharge is not granted unless it is shown that the failure to pay that amount arose from circumstances for which the bankrupt is not responsible. A sequestration may also be brought to an end and the bankrupt obtain his discharge by the creditors, with the approval of the court, accepting an offer of composition made by the bankrupt or his friends. In the event of the composition not being paid, the original debts do not revive; and if the debtor is again sequestrated, the creditors in the former sequestration can rank only for their composition claims, so far as unpaid. There are also powers of winding up the estate under a deed of arrangement. The Court of Session may recall a sequestration where, from the situation of the assets and the residence of the majority of the creditors, it appears that the distribution ought to take place in England or Ireland.

The process of summary sequestration was introduced by the Bankruptcy Act of 1913 in place of the former process of *Cessio Bonorum* (q.v.). It is available where the assets of the debtor's estate do not in the aggregate exceed £300 in value. The procedure, which is regulated by secs. 175 and 176 of the act of 1913, is cheaper and more expeditious than that in an ordinary sequestration. It is not competent in the case of a deceased debtor.

In Scotland the accountant of court has important powers and duties of supervision in bankruptcies. He keeps a register of sequestrations and a register of unclaimed dividends, and also makes an annual report to the Court of Session showing the state of each depending sequestration.

See Williams, *Law and Practice in Bankruptcy* (9th ed. 1908); Baldwin, *Law of Bankruptcy* (10th ed. 1910); Wace, *Law and Practice of Bankruptcy* (ed. 1904); Ringwood, *Principles of Bankruptcy* (10th ed. 1908); Robb, *Law and Practice of Bankruptcy in Ireland* (ed. 1907); Goudy, *The Law of Bankruptcy in Scotland* (4th ed. by Fyfe, 1914); Wallace, *Law of Bankruptcy in Scotland* (1914); and for the United States, the manuals by Bump (11th ed. 1898) and Brandenburg (2d ed. 1901).

Banks, Sir Joseph, born in London, 13th February 1744, and educated at Oxford, in 1766 made a voyage to Newfoundland, collecting plants; and in 1768–71 he accompanied Cook's expedition round the world in a vessel equipped at his own expense. In 1772 he visited the Hebrides and Iceland. In 1778 he was elected President of the Royal Society, an office which he held for forty-one years; in 1781 he was created a baronet, and in 1802 a member of the French Institute. He died 19th June 1820. His services to Australia can hardly be overrated. He was assiduous in urging that the first settlement in New South Wales should be made; he helped to appoint the early governors; he encouraged the explorers, both by land and by sea; he aided the early settlers with live-stock, plants, expert advice, and money. 'To him more than to any other man it is due that the English colony took firm hold on the soil of New South Wales.' He founded also the African Association. Through his efforts the bread-fruit tree was transferred from Tahiti to the West Indies, and the mango from Bengal, as well as many of the fruits of Ceylon and Persia. Many naturalists and travellers were indebted to him for zealous assistance. Some articles excepted, Banks wrote nothing but *A Short Account of Blight, Mildew, and Rust* (1805); *Circumstances relative to Merino Sheep*

(1809); and his *Journal* during Cooke's first voyage, edited by Hooker in 1896. He bequeathed his library and a rich collection of specimens to the British Museum. See a book on him as 'a father of Australia' by J. H. Maiden (1910), and a Life by E. Smith (1911).

Banks, Nathaniel Prentiss, American politician and soldier, was born in Massachusetts, 30th January 1816. At first a factory-worker, he studied law, and became successively a member of the state and the national legislatures. He was Speaker of congress in 1856, and in 1857, 1859, and 1861 was elected governor of his native state. In the Civil War he took a command in the army, at first on the Potomac, then at New Orleans, and finally on the Red River. He re-entered congress as a republican in 1864, was long chairman for foreign relations, and died 1st September 1894.

Banks, Thomas (1735–1805), sculptor, born in Lambeth, was apprenticed to an ornament-carver, and in 1763 gained a medal for a bas-relief from the Society of Arts, in 1770 the gold medal of the Royal Academy. In 1772–79 he was in Rome, but on his return to London his refined imaginative style was little appreciated. In 1781 he visited Russia.

Banksia, a genus of the Australian family Proteaceæ (q.v), named in honour of Sir Joseph Banks. Most of the species are shrubs, but a few become small trees. They have hard dry leaves, generally white or very pale green beneath, and present a remarkable appearance from the peculiar arrangement of their branches, which bear towards their extremities oblong heads of very numerous

Banksia:
A, shoot; B, single flower enlarged; C, in section.

flowers. The flowers secrete much honey. Some of the species are now frequent ornaments of greenhouses in Britain. They are abundant in all parts, especially around the coasts, forming, indeed, a characteristic feature of Australia's vegetation, and are called Honeysuckle trees. *B. grandis*, found at Swan River, exceeds all the rest of the genus in size. It is said occasionally to attain a height of 50 feet.

Banks Land, an island in the west of Arctic America, discovered by Parry in 1819, explored by McClure in 1850, and named by him Baring Island. It is separated by McClure (or Banks) Strait from Melville Island, lying to the north-east, and by Prince of Wales Strait from Prince Albert Land (Victoria Island), lying eastward.

Bank'ura, a town, capital of a district in Bengal, on the north bank of Dhalkisor River. It is a healthy place, with a trade in rice, oil-seeds, cotton, and silk. Pop. 25,000.—The district, in Bardwan division, Bengal, has an area of 2621 sq. m.; pop. (1921) 1,019,941, most of whom are Hindus.

Bann, two rivers in the north-east of Ireland—the Upper Bann, flowing into, and the Lower Bann, out of Lough Neagh. The Upper Bann rises in the Mourne Mountains, and runs 25 miles NNW. through the counties of Down and Armagh. The Lower Bann, strictly the continuation of the Upper, issues from the north-west corner of Lough Neagh, and flows 40 miles NNW., through Lough Beg, dividing the counties of Antrim and Londonderry. It runs past Coleraine, into the Atlantic Ocean, 4 miles SW. of Portrush. It has important salmon and eel fisheries. Vessels of 200 tons can reach Coleraine by the river, 4 miles from the ocean.

Bannatyne Club, a literary club deriving its name from George Bannatyne (1545–1608), a native of Forfarshire, and burgess of Edinburgh, to whose manuscript, compiled during the pestilence of 1568, we are indebted for the preservation of much of the Scottish poetry of the 15th and 16th centuries. The Bannatyne Club was instituted in Edinburgh in 1823 by Sir Walter Scott, with the assistance chiefly of David Laing of the Signet Library, Archibald Constable, and Thomas Thomson. Its object was to print rare works illustrative of Scottish history, topography, poetry, miscellaneous literature, &c., in a uniform and handsome manner, either at the expense of the club, or as the contributions of individual members. The club originally consisted of 31 members only, who paid an annual contribution of five guineas; but, owing to the anxiety of many eminent men to become members, the number was gradually extended to 100. Its first president was Sir Walter Scott, who was succeeded by Thomas Thomson, and Lords Cockburn and Rutherfurd; and its first secretary was David Laing, who continued to its close to discharge the duties of the office. The club, which had its annual—and apparently rather convivial—meetings in December, was dissolved in 1861, having printed 116 works. A complete set was sold in 1887 for £235, and one in 1905 for £139. The Bannatyne MS. (from which Allan Ramsay extracted most of his *Evergreen*) was published in full by the Hunterian Club (1874–86). The Scottish Text Society began its edition in 1928 (ed. Ritchie).

Banner, a term sometimes loosely used to signify any military ensign or standard, but in a more strict sense denoting a square flag charged with the coat of arms of the owner. The banner was borne by sovereigns, princes, barons, and bannerets, and served as the ensign both of the owner of it and of his retainers and followers. It differed from the pennon not only in being square and not pointed, but in bearing only the owner's arms, and not his badge or device; and therefore the pennon of a newly made Banneret (q.v.), though intended to represent a banner, was not exactly one. The royal standard of the United Kingdom, and the cavalry standards in use in the army, are in strictness banners. See the article Flag.

Banneret, a higher grade of knighthood conferred by the sovereign for some heroic act performed in the field, and so called because the pennon of the knight was then exchanged for the banner—a proceeding which was effected by the sovereign on the field of battle standing beneath his own royal standard displayed, and tearing off the points of the pennon so as to give it the requisite square shape of the banner. The Roll of Caerlaverock contains an enumeration of 87 bannerets, including the king himself, 11 earls, and the Bishop of Durham, as present in the campaign of Edward I. in Scotland in 1300. During the reign

of Elizabeth, the degree of banneret was allowed to die out in England; but it was revived in 1642, when Colonel John Smith, who recovered the royal standard at Edgehill, had that dignity conferred on him by Charles I. Sir John Smith was properly the last knight-banneret made in England; for, though George III. bestowed the title on Sir William Erskine in 1764, and on five naval officers in 1773, the proceeding was considered irregular, as the ceremony was performed at a review, and not in actual warfare; and the rank of the recipients of the honour was therefore not generally recognised.

As occupying a rank intermediate between barons and ordinary knights, bannerets have sometimes by an etymological misapprehension been styled 'baroneti' instead of 'bannereti.'

Bannock, a cake of home-made bread, common in Scotland and the north of England. It is usually composed of pease-meal or of pease and barley meal mixed; prepared without any leaven, it is baked on a circular plate of iron, called a girdle. When made of mixed meal, it is often called a *mashlum bannock*. 'Bannocks of barley-meal' form the theme of a popular Scottish song. The word bannock is from the Gaelic *bannach*, 'a cake.'

Bannockburn, a Stirlingshire village of 3000 inhabitants, 3 miles SSE. of Stirling, on the Bannock Burn, a little affluent of the Forth. It is an important seat of the woollen manufactures, especially of carpets and tartans. Tanning is carried on to some extent, and the neighbouring villages are noted for the manufacture of nails; whilst coal abounds in the vicinity. In the great battle of Bannockburn, fought on Monday, 24th June 1314, Robert Bruce, with 30,000 Scots, gained a signal victory over Edward II., with 100,000 English, and secured his throne and the independence of Scotland. The English are said to have lost 30,000, and the Scots 8000 men. The 'Bore Stone,' on which Bruce is said to have fixed his standard on that eventful day, is still to be seen on an eminence; and near it is a flagstaff, 120 feet high, erected in 1870. Not far off was fought the battle of Sauchieburn. See SCOTLAND, BRUCE, Lang's *History of Scotland*, vol. i. (1900), and books by Mackenzie (1913) and Morris (1914).

Banns, one of three alternative preliminaries to the legal celebration of marriage in England, the other two being episcopal license and a registrar's certificate. Banns of marriage, like many of our ecclesiastical regulations, have their origin in the ancient practice of the Roman Catholic Church, which our reformers wisely refrained from abolishing. By the publication of these banns is meant the legal proclamation or notification within the parish, district, or chapelry, and in the proper church or chapel, of the names and descriptions of the persons who intend to be there married; the object being that all who have objections to the marriage may be enabled to state them in time. If the bridegroom live in a different parish from the bride, the banns must be proclaimed also in that parish, and a certificate of such proclamation must be produced before the celebration of the marriage. According to the old English canon law, the publication of banns might be made on *holidays;* but a change was made to *Sundays* by Lord Hardwicke's Marriage Act in 1753, and although that act was afterwards superseded by the 4 Geo. IV. chap. 76, the regulation as to Sundays has been since continued. Seven days' notice at least must be given to the clergyman before publication of banns. Banns are to be published in an audible manner, according to the rubric prefixed to the marriage-service in the *Book of Common Prayer*, upon three Sundays preceding the ceremony, during the time of morning-service, or of evening-service (if on the day of publication there shall be no morning-service) immediately after the second lesson. Marriages celebrated without publication of banns, or license, or a registrar's certificate, are null and void. By the Marriage Act of 1836, the bishop may license chapels for the celebration of marriages in populous places; and by 1 Vict. chap. 22, banns may be published in such chapels. If the marriage be not celebrated within three months after publication of banns, the marriage shall not take place until the banns shall have been *re*published on three several Sundays, unless it be a marriage by license, or now, by certificate, which two latter alternatives, however, must also be availed of within the three months.

The purpose of the law is to secure public knowledge of intended marriages, and therefore it is not necessary that such publication should be made in the real baptismal names of both or either of the parties; it is sufficient that the banns be published in the names by which the parties are *known*, or either of them. But if either of the names used be false, to the knowledge of *both* parties, the marriage is void. As the publication of banns invites people to object, if the parent or guardian express dissent, it is the duty of the clergyman, when such objections are offered, to proceed no further; and if he marry a minor, notwithstanding such dissent, he will be liable to severe penalties by the ecclesiastical law, though he will not be liable to an indictment. Again, on the other hand, if a clergyman of the Church of England refuse, without cause, to perform the marriage, he is liable to an action.

In Scotland, Fraser shows that banns were first sanctioned by councils which were held in that country long before the time of the Council of Trent. After the Reformation in Scotland, the practice of proclaiming banns was continued. In 1712 the privilege of publicly celebrating marriage was extended to the Scotch *Episcopalian* clergy, and in 1834 to those of other dissenting bodies. When both of the parties have their *Domicile* (q.v.) within Scotland, and enter into marriage in England or Ireland, they must have their banns proclaimed in the parish of their domicile in Scotland, otherwise they are liable to the penalties of clandestine marriage. By the Marriage Notice Act, 1878, a certificate of publication of notice of marriage may be issued by a registrar to persons resident for fifteen days in the district; the fee for registry is 1s. 6d.

The Scots law differs from the English in regard to the effect of non-publication of banns. In England, in some cases, the consequence is to render the marriage absolutely void. In Scotland, however, marriage, without proclamation of banns, is valid; but in such case the parties, celebrator, and witnesses, are liable in special penalties. See MARRIAGE; REGISTRATION OF BIRTHS, DEATHS, AND MARRIAGES.

In the United States, banns of marriage are not required in most states, having been gradually superseded by the marriage license; in some states even this is not required. Each state has entire jurisdiction over its own citizens on the subject of marriage.

Banquette, in Fortification, is a raised ledge or step inside the parapet of a rampart, of such a height that musketeers, when standing on it, may be able to fire over the crest of the parapet without too much exposure to the enemy.

Banshee, in the folklore of the Irish and Western Highlanders of Scotland, a female fairy who makes herself known by wailings and shrieks, before a death in the family over which she exercises a kind of guardianship. This notion is woven

into many folk-tales of rare pathos and beauty. A guardian spirit of the same kind occurs frequently in the folklore of Brittany. The name is supposed to be a phonetic spelling of the Irish *bean sídhe*, old Irish *ben síde*, 'woman of the fairies.'

Banswara, a state in the south-west of Rajputana. The surface is hilly, with much timber; it has an area of 1946 sq. m., and is peopled by wild and turbulent Bhils. This state was fearfully oppressed by the Mahrattas, till, in 1818, it passed voluntarily into British protection. Population (1911) 165,463.—The capital, also called Banswara, lies 8 miles W. of the Mahi River. Pop. 8000.

Bantam', a seaport, now decayed, about 61 miles W. of Batavia, in a residency of the same name, which forms the west end of Java. It occupies an unhealthy situation, on a low swampy beach. It was the first Dutch establishment in Java (1595), and the seat of government of the residency, until transferred to the more salubrious Serang, 6 miles distant, in 1816. The harbour is now much obstructed by coral-reefs and other deposits, and the trade has gone to Batavia. Pop. of residency, about 700,000.

Ban'tam Fowl (*Gallus bankiva*), a well-known variety of the common Domestic Fowl, originally brought from the East Indies, and supposed to derive its name from Bantam, in Java, though they probably came from Japan. It is remarkable for smallness and pugnacity. There are several sub-varieties. Most of them have the legs much feathered. The flesh and eggs are good. The hen lays well in winter. See POULTRY.

Banteng (*Bos sondaicus*), a species of ox, a native of Java and Borneo, resembling the Gaur (q.v.) of India. The banteng is black, with white legs; the hair is short and sleek, the limbs slender, the muzzle sharp; the back rises into a high arch immediately behind the neck. It inhabits forests, and has been generally described as untamable.

Banting System. See OBESITY.

Bantock, GRANVILLE, composer, was born in London, 7th August 1868. He gained a scholarship for composition at the Royal Academy of Music (1889), and afterwards conducted in many towns. In 1900 he became principal of Birmingham School of Music, and in 1908 professor of music in Birmingham University. His compositions include many orchestral pieces—*Atalanta in Calydon* (1912; a 'choral symphony'), *Hebridean Symphony*, &c.

Bantry, a seaport town in the south-west of County Cork, Ireland, in a cove opposite Whiddy Isle, at the head of Bantry Bay, and 44 miles WSW. of Cork. The chief trade is the export of agricultural produce. A little fishing is carried on. In last century there was an extensive pilchard-fishery here; but the pilchard has now deserted the coast. Many tourists resort to Bantry in summer. Pop. 3200.

Bantry Bay, a deep inlet in the south-western extremity of Ireland, in County Cork. It is 25 miles long, running ENE., with a breadth of 4 to 6 miles. It is one of the finest harbours in Europe, affording safe and commodious anchorage for ships of all sizes. Here a French force attempted to land in 1796. The coast around is rocky and high.

Bantu ('people'), a native word adopted for a large group of African languages, and the peoples speaking the same. The Bantu peoples occupy most of Africa from 5° N. lat. southwards, and are broadly distinguished from the Negritos and Hottentots to the south-west, and the Sudanese negroes to the north. They fall geographically into three divisions. The eastern includes Kaffirs (q.v.) and Zulus (q.v.), and extends to the Galla and Somali country, the Swahili being the most northerly section. The central division comprises Bechuans (Basutos, Barolong, &c.). To the western division belong the inhabitants of the west coast from the Hottentot country to the Gulf of Guinea, the peoples of Benguela, Angola, Congo, Loango. The linguistic inter-relationship, as intimate as that of the Indo-Germanic family, was first recognised by Gabelentz and Pott, and afterwards elaborated by Bleek. It rests both on roots and on grammar. Within the family are included by Lepsius all the negro languages of Central Africa. See AFRICA, and Sir H. H. Johnston's *Comparative Study of Bantu and Semi-Bantu Languages* (1919–22).

Banville, THÉODORE DE, a French poet and prose-writer, the son of an officer in the French navy, was born at Moulins in 1823. His first volume, *Les Cariatides*, issued in 1841, gave him a standing as a poet among the younger members of the Romantic school, and was followed by *Les Stalactites*, *Rimes Dorées*, *Trente-six Ballades Joyeuses*, *Les Exilés*, *Les Occidentales*, *Odes Funambulesques*, *Comédies*, *Esquisses Parisiennes*, *Contes pour les Femmes*, *Contes Féeriques*, *Mes Souvenirs*, *Petit Traité de Poésie Française*, and *Dans la Fournaise* (1892). He was one of the most musical and sparkling of lyrists; one of the gayest and wittiest of parodists. The title 'roi des rimes' was given him from the graceful ingenuity with which he handled the most difficult forms of verse—the ballades, rondeaux, and rondels of the mediæval writers—which he restored to popularity in France, and which Andrew Lang and Austin Dobson, following his example, successfully introduced into English poetry. De Banville was an eloquent but hardly a discriminating critic. He died 12th March 1891.

Banyan, or BANIAN (*Ficus indica*), an Indian tree, remarkable for its vast rooting branches. It is a species of Fig (q.v.); has ovate, heart-shaped entire leaves, about 5 or 6 inches long; and produces a fig of a rich scarlet colour, not larger than a cherry, growing in pairs from the axils of the leaves. The branches develop pendulous adventitious roots, which soon become new stems, the tree in this manner spreading over a great surface,

Banyan Tree.

in fact almost developing into a wood, and enduring for many ages, although the original central trunk decays. One has been described as having no fewer than 350 stems equal to large oaks, and more than 3000 smaller ones, covering a space sufficient to contain 7000 persons. The tree is inhabited by great numbers of birds, fruit-bats, and monkeys, which latter consume the leaves as well as the fruit. The seeds are often deposited by birds in the crowns of palms, and send down roots which become stems

and eventually replace the palm altogether. The wood of the banyan is light, porous, and of no value; but the tree furnishes lac and caoutchouc, and the bark and milky juice are sometimes employed in Hindu native medicine. By the Brahmins the banyan is held in special reverence, as is its congener the Sacred Fig, also called Peepul and Bo-tree (*F. religiosa*) by the Buddhists, so that sites of temples can be distinguished as Brahmin or Buddhist by the presence of one or other tree.—For the traders called Banyans, see BANIANS.

Banyuls-sur-Mer, a town of France in the Pyrénées Orientales, with a fishing-port on the Mediterranean, close to the Spanish frontier, 21 miles SE. of Perpignan by rail. The bathing brings many visitors in summer. Pop. 3000.

Banyumas, a town of Java. It is situated at the opening of an extensive and fruitful valley on the left bank of the Serajo, 22 miles from the south coast. Pop. 9000. It is well built, and carries on a considerable trade, is the residence of a Dutch governor, and has a fort and garrison. It is the capital of a province of the same name, which produces coffee, sugar, indigo, rice, tobacco, &c. The area of the province is 2136 sq. m.; pop. a million and a half, of whom only some 900 are Europeans. The district is low and marshy towards the coast, but very mountainous in the north and east. The volcanic plateau of Dieng (6700 feet) contains the terrible 'valley of death,' a ravine full of volcanic gases, principally carbonic acid.

Banyuwan'gi, a prosperous seaport town and military post belonging to the Dutch, on the east coast of Java, capital of a district of the same name, and an important station of the telegraph connecting Europe and Australia. Pop. about 15,000.

Banz, once one of the richest and most famous of the Benedictine monasteries, on the right bank of the Main, 3 miles below Lichtenfels. Founded in 1071, and destroyed in the Peasants' War in 1525, it was rebuilt, and although plundered again in the Thirty Years' War, it gradually became famed for the scientific attainments of its monks. In 1803 it was broken up, and its library and collections divided between the Munich museum and other institutions.

Baobab (*Adansonia digitata*), a magnificent tree belonging to the natural order Bombaceæ

Baobab Tree.

(q.v.), also called the Monkey-bread Tree, is a native of tropical Western Africa, but now introduced into the East and West Indies. It is one of the very largest trees—not rising to a great height, but exceeding almost all other trees in the thickness of its trunk (20–30 feet). Even its branches (60–70 feet long) are often as thick as the stems of large trees, and they form a hemispherical head of 120–150 feet in diameter; their outermost boughs drooping to the ground, with large horse-chestnut-like leaves, and huge white solitary drooping flowers. The fruit (called Monkey-bread) is large and woody. The pounded leaves are mixed with the daily food of the inhabitants of tropical Africa; and Europeans in that country employ them as a remedy for diarrhœa, fevers, and diseases of the urinary organs. The pulp of the fruit is pleasant and slightly acid; and the expressed juice mixed with sugar is much esteemed as a refreshing and cooling beverage, specially grateful in fevers. The bark is said to be powerfully febrifugal, and yields a very strong fibre, but the wood is soft and readily attacked by fungi.

Bapaume, a French town, department of Pas-de-Calais, 12 miles S. of Arras. Here, on the 2d and 3d January 1871, the French were defeated by the Prussians, with a loss of over 2000. It was in German hands in 1914–17 and March–August 1918, and was wrecked. See WORLD WAR.

Baphomet, the alleged name of a mysterious idol which the Templars were accused of worshipping. According to the oldest and most common interpretation, the word is a corruption of Mahomet, to whose faith the members of the order were accused of having a leaning. The symbol consisted of a small human figure, having two heads, male and female, and environed with serpents, the sun, and moon. Hammer, with little probability, explains the word as formed from Gr. *baphē* ('baptism') and *mētis* ('wisdom'), the Gnostic baptism—a species of spiritual illumination, which was interpreted sensually by later Gnostics, to whose licentious practices he declares them to have been addicted. According to L'Abbé Constant's *Dogme et Rituel de la haute Magie*, quoted by Littré, the word was cabalistically formed by writing backwards *tem. o. h. p. ab.*, abbreviation of *templi omnium hominum pacis abbas*, 'abbot (father) of the temple of peace of all men.'

Baptism (Gr. *baptismos*, from *baptizō*, frequentative of *baptō*, 'I dip or dye'), one of the Sacraments (q.v.) of the Christian church, deriving its name from the rite of washing with water, which forms an essential part of it. Baptism is almost universally acknowledged among Christians as a sacrament, and is referred to the authority of Christ himself, whose express command to administer it is recorded in the gospels (Matt. xxviii. 19; Mark, xvi. 16).

The name and the rite were not altogether new, however, when the ordinance was instituted by Christ. Religious meanings were early attached to washings with water, both by heathens (cf. Ovid, *Fasti*, ii. 45—

> Ah, nimium faciles, qui tristia crimina cædis
> Fluminea tolli posse putetis aqua)

and Jews; they were among the ordinances of the Jewish law; and it is not necessary to go beyond that law to find the origin of the custom of washing or *baptising* proselytes upon their admission into the Jewish church, though we have no absolute proof of the existence of this type of baptism in pre-Christian times. Washing with water was requisite for the removal of ceremonial uncleanness, and every proselyte must have been regarded as ceremonially unclean prior to his admission into the Jewish church. John the Baptist baptised not proselytes upon their renouncing heathenism and entering the Jewish church, but those who, by birth and descent, were members of it, to

indicate the necessity of a purification of the soul from sin—a spiritual, and not a mere outward, change.

In connection with the Christian sacrament there has always been a controversy as to the proper subjects of baptism: whether it should be administered to adults only on profession of faith, or to infants as well. The baptism of adults was certainly the common practice in the apostolic age, for which an obvious cause presents itself in the fact that the first members of churches were converts from Judaism or from heathenism. It is generally held, however, by those who advocate the baptism of infants, that it was the practice of the early church to baptise the infants of Christians, on the ground of the statements in Acts, xvi. 15, 33, that whole 'households' were baptised. This again is as stoutly denied by others, who allege that infant baptism crept in along with other corruptions. For neither opinion can any positive historical proof be adduced, the arguments on both sides being mainly inferential.

The chief argument in favour of infant baptism is based upon the fact that all the Old Testament covenants included children within their scope, and provided the rite of circumcision as a seal to prove that they were the objects of the divine favour. The Christian faith, it is argued, is the fulfilment of the ancient covenant, and it is inconceivable to suppose that children were deprived of the spiritual privilege which, as the rite of circumcision shows, they possessed in pre-Christian times. Baptism obviously takes the place of circumcision in the new dispensation, and as the latter was administered to children, the former should also be administered to them. In reply to the argument that the New Testament contains no express command for infant baptism, it is urged that the *onus probandi* rests upon those who challenge the rite. The words and actions of Jesus (Mark, x. 14) may be taken as a proof that he had no intention whatever of depriving infants of the privileges which they possessed under the old covenant. On the contrary, he seems to have assigned them a higher place in the kingdom of heaven than they ever possessed in the Jewish dispensation. Though textual proof is admitted to be lacking, and it is now widely acknowledged that the general practice of the early church limited baptism to adults, it is maintained that the introduction of infant baptism is in full accord with the spirit, if not the letter, of the teaching of Jesus. For the arguments on the other side, see BAPTISTS.

It is admitted on all hands that at an early period in the history of the church baptism was administered to infants, although, even after it had been set forth as an apostolic institution, its introduction into the general practice of the church was slow. The earliest direct evidence claimed for the practice is a passage from Irenæus, who flourished in the latter half of the 2d century. Tertullian, who came a little later, looked with disfavour on infant baptism; but it was regarded by Origen (*c.* 185-254) as an apostolic institution. As such it was acknowledged in the North African church and in the Alexandrian and Syro-Persian churches in the 3d century; though it was not until the 5th century that it became fully established as the general practice of the Christian church. This it has unquestionably continued to be from that period to the present day, feebly opposed by some of the sects of the middle ages, and more vigorously by some Protestants. See BAPTISTS.

Both the practice and the neglect of infant baptism in the early ages of the church were connected with particular views of religious doctrine, and of the nature and purpose of baptism itself. The prevalence of the Augustinian doctrine of Original Sin is generally regarded as a principal cause of the prevalence of infant baptism; though Pelagius, whilst opposing that doctrine, maintained the necessity of infant baptism. No little influence must be ascribed to the growing belief in the absolute necessity of baptism to salvation, and in a sort of mysterious efficacy in the rite itself. It is certain, on the other hand, that the belief in the forgiveness of sins in baptism led to a practice of deferring it as long as possible, in order that all sins might be blotted out at once. Thus the Emperor Constantine the Great was baptised only a short time before his death. The approach of a war or pestilence caused many to rush forward in haste to be baptised, who had previously delayed.

The Anglican and Lutheran churches, like the Roman Catholic, regard the baptism of infants as admitting them into the church, and making them members of Christ's body. Other Reformed churches hold that the children of Christians are included in the visible church from their birth, and therefore entitled to baptism.

Two modes of baptism are practised: by immersion or dipping, and by aspersion or sprinkling, concerning which there has been much controversy in the early period of the church's history, as well as in recent times. Affusion or pouring, the common practice of the Church of Rome, may be regarded as essentially one with sprinkling. The advocates of sprinkling universally admit the validity of baptism administered in the other mode, but the advocates of immersion generally refuse to acknowledge that baptism by sprinkling can be true Christian baptism. The opponents of infant baptism, almost without exception, insist upon immersion; whilst aspersion or affusion of water is general, except in the Eastern churches, wherever the baptism of infants prevails. The argument upon which Baptists depend most of all is that from the word baptism and the verb *baptizō*, which, in classic Greek, signifies to immerse. On the other side, it is contended that a strict limitation to this sense does not well accord with its character as a 'frequentative' form of *baptō;* and instances are adduced from the New Testament itself in which this signification cannot easily be attached either to the noun or to the verb, as 1 Cor. x. 2, where Paul says that the Israelites were 'baptised unto Moses in the cloud and in the sea;' and Heb. ix. 10, Mark, vii. 4, and Luke, xi. 38, where both verb and noun are employed concerning the *washings* of the Jews, and the noun, even of their washing of 'cups, and pots, brazen vessels, and of tables.'

To the argument in favour of immersion derived from the phrases employed when baptism is mentioned in Scripture—as when we are told that John the Baptist baptised 'in Jordan' (Matt. iii. 6), that our Lord after his baptism 'went up out of the water' (Matt. iii. 16), that Philip and the Ethiopian eunuch 'went down both into the water' (Acts, viii. 38)—it is replied that all the passages of this description, even if their meaning were certainly as precise and full as Baptists suppose it to be, are insufficient to sustain the weight of the conclusion as to the necessity of a particular mode of baptism; that, on the contrary, it is far from being clear that these passages must be interpreted, or the meaning of the Greek prepositions so strictly defined, as the argument requires; and, further, that there are instances mentioned in Scripture which afford a presumptive argument in favour of another mode of baptism, as when we are told of great numbers being added to the church in one day, whilst there is no intimation of the converts being led to any pool or river to be baptised. To the argument drawn from the language of Paul in Rom. vi. 4, Col. ii. 12 (see BAPTISTS), it is replied

that it depends upon a fanciful interpretation of these texts. According to the advocates of baptism by sprinkling, their opponents commit the great error of attaching too much importance to the question of the mode of baptism.

It is, however, indisputable that at a very early period the ordinary mode of baptism was by immersion, in proof of which we may cite the fact that baptisteries were erected in most ancient churches. But baptism was administered to sick persons by sprinkling; although doubts as to the complete efficacy of this *clinical* baptism was evidently prevalent in the time of Cyprian (middle of 3d century). We have an interesting piece of evidence with regard to the transition from immersion to sprinkling in the *Didache* (*c.* 100): 'Baptize . . . in flowing water. If you have not flowing water, baptize in other water. If you cannot do it in cold water, do it in warm. If neither is possible, pour it on the head thrice.' Baptism by sprinkling gradually became more prevalent; and a dispute concerning the mode of baptism became one of the irreconcilable differences between the Eastern and Western churches, the former generally adhering to the practice of immersion, whilst the latter adopted mere pouring of water on the head, or sprinkling on the face. This practice, although generally adopted in the West from the 13th century, was not universal, for it was the ordinary practice in England before the Reformation to immerse infants, and the Fonts (q.v.) in the churches were made large enough for this purpose. It continued to be the practice even till the reign of Elizabeth; and the change which then took place is ascribed to the English divines who had sought refuge in Geneva and other places on the Continent during the reign of Mary. To this day the rubric of the Church of England requires that, if the godfathers and godmothers 'shall certify him that the child may well endure it,' the officiating priest 'shall dip it in the water discreetly and warily;' and it is only 'if they certify that the child is weak,' that 'it shall suffice to pour water upon it;' although sprinkling is now the ordinary practice.

Besides the simple rite of washing with water, and the pronouncing of the formula which declares it to be 'in the name of the Father, and of the Son, and of the Holy Ghost,' baptism was accompanied, from an early period in the history of the church, with various forms and ceremonies. These ceremonies are almost all retained in the Church of Rome, and also generally in the oriental churches, but have been almost entirely laid aside by Protestants. The Church of England retains the sign of the cross made upon the forehead after baptism, but the other Protestant churches in Britain reject it. It was an ancient custom that the *catechumens*, as candidates for baptism were called while receiving instruction with a view to that sacrament, when they were to be baptised, publicly made a profession of their faith and a renunciation of the devil and all his works. The profession of faith is still retained by Protestant churches as the formal ground of the administration of baptism; the renunciation of the devil and his works is required by the Church of England of the person baptised, if an adult, or of the *sponsors* or 'sureties' of a child.—Sponsors were early admitted to answer for those who could not answer for themselves, and particularly for infants. The belief in the absolute necessity of baptism to salvation led even to baptism of the dead among the Montanists in Africa, in which sponsorship was also introduced. Presbyterian and Independent churches generally reject all sponsorship, and regard the profession made by parents as simply a profession of their own faith, which entitles their infants to baptism. The ancient practice of Exorcism (q.v.) immediately before baptism, has been rejected as superstitious by almost all Protestant churches; as have also that of immersing three times (*trine immersion*), or sprinkling three times, with reference to the three Persons of the Godhead—that of breathing upon the baptised person, 'to signify the expulsion of the devil,' and to symbolise the gift of the Holy Spirit—that of anointing with oil (*Chrism*, q.v.), to symbolise the same gift, or to indicate that the baptised person is ready, like a wrestler in the ancient games, to fight the good fight of faith—that of giving him milk and honey, in token of his spiritual youth, and of his reception of spiritual gifts and graces—that of putting a little salt into his mouth, to signify the wisdom and taste for heavenly things proper to a Christian—that of touching his nostrils and ears with spittle, to signify that his ears are to be ever open to truth, and that he should ever feel the sweet odour of truth and virtue—and that of clothing him after baptism with a white robe (the *chrysome*), in token of the innocence of soul which by baptism he was supposed to have acquired. The white robe and the anointing with oil were retained in the Church of England for a short time after the Reformation.—The giving of a name in baptism (see the article NAMES) is no essential part of it, but is a custom apparently derived from that of the Jews in circumcision (Luke, i. 59–63).—The Church of Rome prefers the use of Holy-water (q.v.) in baptism, but regards any water as fit for the purpose in case of necessity.—According to an ancient usage long obsolete, the ordinary administration of the rite (solemn baptism) was limited to the two great festivals of Easter and Whitsuntide.—Whether baptism may be administered in private has been much debated, both in ancient and modern times. The administration of baptism in private houses, and not in the presence of a congregation, was one of the things earnestly contended against by the Presbyterians in Scotland in the first half of the 17th century; though it is now very usual in some denominations. And apparently upon this latter ground, baptism in private houses is also discouraged by the Church of England, though it is allowed if there is 'great cause and necessity.'

'Baptism for the dead,' alluded to by St Paul (1 Cor. xv. 29), seems to imply that a living man was baptised for a dead and unbaptised Christian, on whom thereby the privileges flowing from baptism were conferred; this baptism is practised by Mormons. (For other questions on baptism, see CIRCUMCISION, GORHAM, GREEK CHURCH, ROMAN CATHOLIC CHURCH, and especially SACRAMENT.) The opinions early became prevalent that forgiveness of sins is obtained and spiritual life begun in baptism, and that it is indispensably necessary to salvation—the only exception made, if any was made at all, being in the case of adult believers, who, desiring baptism, were prevented from receiving the rite, and particularly of those who suffered martyrdom, which was generally held to be equivalent to baptism. The Church of Rome still owns, as supplying the place of baptism by water, these two—baptism by desire, and baptism by blood, i.e. martyrdom.—According to the general doctrine of the Protestant churches, baptism is 'a sign and seal' of the covenant of grace, representing as a sign the blessings of the covenant, and as a seal, confirming the covenant. As a sign, it is generally held to represent in its rite of washing, the removal both of guilt and corruption, by the blood and by the Spirit of Christ, and so to relate equally to pardon and regeneration, although some have limited its symbolic reference to regeneration alone. One of the most important points disputed concerning baptism, is that of baptismal regeneration (see REGENERATION).

Some early Christian sects appear to have rejected baptism, on grounds somewhat similar to those on which it is rejected by Quakers (see FRIENDS) at the present day, who explain the passages relating to it symbolically, and insist that a spiritual baptism is the only real baptism of Christians.

There has been much controversy concerning *Lay Baptism*. We may regard it as certain that in early times the practice of lay baptism was common. Ambrosiaster (a 4th-century writer) says: 'At first all used to teach and all to baptize whenever there was opportunity.' Tertullian (*c.* 200) tells us that, 'in places where there are no clergy, any single Christian may exercise the functions of the ministry—may celebrate the Eucharist and baptize.' With the growth of the sacerdotal conception of the ministry, and the increasing theological significance that came to be attached to baptism, the celebration of the rite was gradually restricted to duly ordained clergy and ministers, except in the most extreme cases.

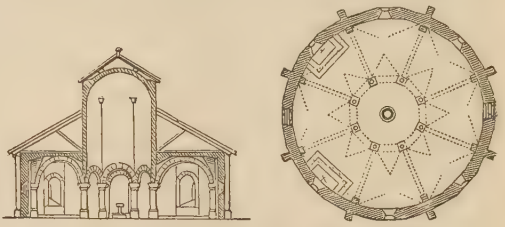
Another question much agitated in the church from early times was that concerning the validity of baptism by heretics. The opinion ultimately prevailed that baptism by heretics is valid, except in the case of those who do not baptise in the name of the three Persons of the Godhead. This continues to be the almost universal opinion. The Church of Rome, however, employs a form of 'conditional baptism' in admitting a Protestant convert to its communion.

The *baptism of bells, ships*, &c. is a custom supposed to have been introduced about the 10th century, and still retained in the Church of Rome. The term *benediction* is sometimes substituted for that of baptism, but the rite itself is very similar to that of baptism, and is accompanied with many similar ceremonies—'a sort of exorcism,' sprinkling with holy-water, anointing 'with the oil of catechumens' and 'with chrism,' a formula of consecration 'in the name of the Father, Son, and Holy Ghost,' and sometimes also, if not always, the giving of a name to the bell consecrated, and even a kind of sponsorship as by godfathers and godmothers in baptism.

See Bingham's *Ecclesiastical Antiquities;* Hall, *Infant Baptism;* Pusey, *Tracts for the Times, No. 67,* and *Scriptural Views of Baptism;* Stanley, *Christian Institutions* (1882); Höfling, *Das Sacrament der Taufe*; books by Godwin (1845), Ingham (1865), Hodges (1875).

Baptiste, a French family of actors. JOSEPH FRANÇOIS ANSELME ('Baptiste *père*') and his wife ('Baptiste *mère*') were both well known on the stage when their elder son, NICOLAS ANSELME (born at Bordeaux in 1761), made a reputation in the provinces under the name of Baptiste. Later he won great popularity, especially in comedy, in Paris. His younger brother, PAUL EUSTACHE ANSELME ('Baptiste *cadet;*' *c.* 1766–1839), born at Grenoble, also succeeded in comedy.

Bap'tistery (Gr. *baptistērion*, 'a large vase or basin'), the name given sometimes to a separate building, sometimes to the portion of the church in which the ceremony of baptism is performed. In the latter case, the baptistery is merely the inclosure containing the font, to be seen in most English churches. According to the earlier arrangements of the Christian church, however, the baptistery seems usually to have been a building standing detached from, though in the immediate vicinity of the church to which it appertained. It was the ceremonial building of the church, in which large numbers of converts were initiated at one time by immersion in the large font in the centre of the floor. In later times, these early baptisteries were frequently converted into churches, as in the case of Asti. At Novara, a very interesting baptistery still exists in connection with the open cloister or atrium, to which alone the neophytes



Section and Plan of Baptistery at Asti.

were admitted before baptism. Baptisteries, at first, were either hexagonal or octagonal, but afterwards became polygonal, and even circular.

The celebrated baptistery of Florence is an octagonal structure, measuring about 100 feet in diameter. It stands detached from, but in the immediate vicinity of the west end of the cathedral. It is built of black and white marble, in the style which Giotto is said to have introduced, and which is still peculiar to Tuscany. The magnificent bronze doors, with their beautiful bas-reliefs, are remarkable features of this famous baptistery. The most celebrated of the three doors was executed by Lorenzo Ghiberti, the earliest being the work of Andrea of Pisa. Fifty years were required for their completion; and it is remarkable that the contracts for their execution are still preserved. Next in importance, and of even greater size, is the baptistery of Pisa. It is circular in form, the diameter measuring 116 feet. The largest baptistery ever erected is supposed to have been that of St Sophia, at Constantinople, which was so spacious as to have served on one occasion for the residence of the Emperor Basilicus.

Detached baptisteries were common in the days of the early church, when adult baptism was practised; but on the introduction of infant baptism, buildings of this size were no longer needed, and the baptistery was absorbed into the church (see APSE). Numerous examples of circular baptisteries on the model of the Italian ones are still to be found in the south of France.

Baptists, like most other Christians, trace their genealogy back to the New Testament. They derive their principles directly from the teaching of Christ Jesus, and from the faith and practice of the Christian societies of the 1st century. They do not claim to possess evidence of a continuous corporate existence through the ages, but they maintain that the central ideas of Baptist life have not lacked representation at any period. The precursors of the modern Baptists are many; Barclay says, in his *Inner Life of the Religious Societies of the Commonwealth*, 'We have strong reasons for believing that on the continent of Europe small hidden societies who have held many of the opinions of the Anabaptists have existed from the time of the Apostles. In the sense of the direct transmission of divine truth and the true nature of spiritual religion, it seems probable that these churches have a lineage or succession more ancient than that of the Roman Church.' Montanists and Novatians, Paulicians and Albigenses, Waldenses and Lollards fought for the essential ideas of the Baptist belief and polity.

Modern Baptists came into existence in the 16th and 17th centuries in the attempt to complete the New Testament answer then being given in Christendom to the question: 'What is a Christian Church, and of what persons ought it to consist?' The Reformers appealed to the Scriptures. Protestantism was the inevitable issue of that appeal. Out of Protestantism sprang Puritanism. Puritan-

ism advanced to Separatism; Separatism resulted in Independency; and Independency prepared for the Baptist protest against the inclusion of infants in the Christian Church, on the ground that that church was, according to the New Testament, composed of none but those who intelligently and consciously received Christ Jesus as their Saviour and Lord. That is the historical root of the Baptists. That is the fundamental principle of the Anabaptist and Baptist faith.

John Smith and Thomas Helwys may claim to be the pioneers and founders of the Baptists of England. That was in 1611. They were 'General' Baptists—i.e. they held that the provisions of redemption were not restricted to particular and elect persons, but were open generally to all men. Probably many of them were Lollards, who both in doctrine and in church government had been stirred and guided by the colonies of Anabaptists who came into this country from the Continent. Nor is this to their discredit. The long-maligned Anabaptists are coming to their own under the influence of fresh and impartial investigation. As early as 1527 they demanded equal liberty for all men in matters of religion. Their doctrine of 'justification by faith' was the purest leaven of the Reformation, and their enthusiastic efforts to apply the law of Christ to every relation of human life, and especially to the ordering of the affairs of states, though too early for their day, yet gave both illumination and impulse to the English Baptists. In 1633 John Spilsbury formed in London a 'Particular' or Calvinistic Church by secession from an Independent society. The two streams of Baptist life flowed on in their separate channels until 1891, when the 'Generals' and 'Particulars' became one. In 1921 the statistics of the United Baptists showed nearly 2000 churches, 3000 chapels (with almost a million sittings), and over 254,000 registered members.

It was in 1633 Baptist life began in Wales. To-day Wales (with Monmouthshire) has 900 churches, with 550 pastors and 124,000 members.

In the days of Cromwell Baptists were planted in Scotland, but they failed to take root. In 1750 Sir William Sinclair founded the church at Keiss, Caithness. Others followed in Glasgow and Edinburgh, and then came the influence of Robert and James Haldane, one of the most important factors in Scottish Baptist life. The membership to-day is 21,000 in 150 churches.

Thomas Patient introduced the Baptists to Ireland in Cromwell's time; but there was little prosperity before the ministry of Dr Alexander Carson; and now there are only about 2900 Baptists in Ireland, distributed over some 40 churches.

In 1921 statistics for Great Britain, Ireland, the Isle of Man, and the Channel Islands returned some 3000 churches, 4200 buildings (accommodating 1,450,000 persons), 400,000 members, 2000 pastors, 518,000 Sunday scholars, and 56,000 teachers.

Roger Williams, a clergyman of the Church of England, passed through similar experiences to those of John Smith, who was a clergyman of the same church, and so became first a Puritan, and next an Independent. Then he sailed for America. There he came to see that true churches could only be formed of regenerate members; and forthwith founded the first Baptist Church in that land. This was in 1638. Baptists have grown marvellously in the States. In 1927 they ranked second to the Methodists (whose figures were the highest among Protestants) with a membership of 8,397,914. But these figures do not include a million and three-quarters of Baptists who are called Disciples or 'Campbellites,' and differ mainly from other Baptists in the emphasis they place on baptism in its relation to the remission of sins; but definite attempts are being made to effect an amalgamation of the Disciples with Baptists generally. The same unifying process is proceeding with the Free-will Baptists. Nor are the Seventh-day Baptists included in these returns.

Of recent facts, the most significant is the emergence of a large number of Baptist churches in Russia and south-eastern Europe. Without the aid of foreign missionaries, and solely through the circulation of the Scriptures, Baptist communities have sprung up in Hungary and Austria, in Moravia and Bulgaria, and throughout the south-east of Europe; sifted statistics are not yet to hand, but it is believed there are now more Baptists in Russia and south-eastern Europe than there are in England. Add Europe, Asia, Africa, and Australia, and the Baptists of the world cannot number less than 12,000,000 enrolled members, exclusive of those who may be regarded as adherents.

The cardinal principles are these: (1) Christ Jesus is the supreme authority in His Church, and the New Testament is the instrument through which His Spirit expresses His living will. (2) Jörg says that the Anabaptists of the 16th century sought 'an entirely new church, a church of believers.' Hast, another witness, declares that 'their aim was the highest possible, a church of saints. Nowhere in church history is found such a subjugation of all other motives to the religious, such an approach to the order and life of the Apostles.' Personal experience of the grace of God in Christ Jesus constitutes the Christian Church, qualifies for service within it, entitles to spiritual freedom, endows with power of government, and gives value to the ordinances of the Christian religion. Baptism is altogether secondary; conscious acceptance of, and subjugation to, Christ is all in all. Baptists do not deny that the soul may meet God in the sacraments; but the soul must meet with God and know God in Christ before it approaches the sacraments. Without the inward experience baptism is a vain show. They baptise; but it is because they are Baptists; they are not Baptists because they baptise. The distinctive note of the Baptist Church is not baptism, but a vital experience of God. (3) Therefore the baptism of babes is rejected as being contrary to the teaching and genius of the religion of Jesus Christ, and as propagating the notion that there is a magical and saving power in the sacrament of baptism. But the practice of the 'Dedication of Infants' is observed, sometimes in the home and with the family into which the new life has come, and sometimes in the public service, as the church's recognition of the relation of the child to God, and of the duty of the parents and of the church to unite in training the child for His service. (4) In many of the churches in England and in some in the United States and Australia the membership is open to all who confess faith in the Lord Jesus Christ. They teach the obligation and privilege of baptism, but leave the whole question to the individual conscience; holding that the duty to be baptised springs out of the relation of the soul to the Saviour, and not from the relation of the believer to the church. But most of the Baptist churches insist upon baptism as a condition of membership, and some treat it as a qualification for the observance of the Lord's Supper. The last are called Strict Baptists. (5) Baptists have no 'creeds.' They refuse to make subscription to 'dogmatic formulæ' a condition of membership or ministry. 'Confessions' of faith have been circulated at different times as expositions, and 'apologies' for the purpose of removing misunderstandings and misrepresentations; but the competence of the regenerate soul to form its own 'creed' by the study of the Scriptures is a fundamental principle. (6) Perfect

freedom of access to God for all souls without any intervening priests is a central belief. The Baptist Church is anti-priestly. The ministry is not a profession, but a 'vocation.' It is an office to which some members of the church are called and designated because of their special gifts. (7) Each church is possessed of the power of self-government under its exalted head Jesus Christ, subject to no foreign tribunal or court of review. Members are received or excluded, and discipline is exercised by all the members. The church is autonomous and democratic. (8) Professor Masson quotes from a 'Confession' of 1611: 'The magistrate is not to meddle with religion or matters of conscience, nor compel men to this or that form of religion; because Christ is the King and Lawgiver of the Church and conscience.' He adds, 'This is the first expression of the absolute principle of liberty of conscience in the public articles of any body of Christians.' Roger Williams made that principle not only the basis of the Church he founded, but also of the state of Rhode Island, and so became the apostle of intellectual, 'political, and ecclesiastical liberty before it was taught in any of the schools of philosophy in Europe.' This involves the separation of church and state. (9) But churches are grouped in associations or unions for the training of ministers, for providing funds for aged ministers, for work amongst the young, for the furthering of the interests common to all the churches, and for the evangelisation of the world.

In the United States some of the wealthiest universities are of Baptist origin, notably Chicago, Brown, and Colgate. Besides the universities, there are many theological seminaries. In Britain there are theological colleges at Bristol and Nottingham, at Rawdon, near Leeds, and Regent's Park, London; at Newington, London, there is the Metropolitan or Pastors' College; and the Brighton Grove College at Manchester. Colleges exist at Cardiff and Bangor, Glasgow, and Dublin. Most of these colleges are associated with the local universities. The Baptist Missionary Society was founded in 1792. No mission band has surpassed that society in zeal and enthusiasm, in self-sacrifice and devotion. The names of Carey, Marshman, Ward, and Knibb, and many others, will be held in grateful remembrance by all succeeding generations. Baptists from all over the world met in a congress in London in 1905, and formed a Baptist World Alliance. The European section of it held a congress in Berlin in 1908, and the whole alliance celebrated the tercentenary of modern Baptists in Philadelphia in 1911. Divisions are disappearing. Union increases. The object of the alliance is the defence and propagation of Baptist principles, and the promotion of the common work of the churches.

See W. T. Whitley, *Minutes of the General Assembly of the General Baptists from 1654 to 1811* (1909), and *History of British Baptists* (1923); A. H. Newman, *A History of Anti-Pedobaptism, from the Rise of Pedobaptism to A.D. 1609* (1897); J. H. Shakespeare, *Baptists and Congregational Pioneers* (1906); B. Evans, *The Early English Baptists*; Adam Taylor, *The History of the English General Baptists* (2 vols. 1818); J. Clifford, *The English Baptists, who they are, and what they have done* (1881); J. C. Carlile, *The Story of the English Baptists* (1905).

Bar, see HERALDRY; and for the so-called 'Bar-sinister,' BATON SINISTER. For bar in other senses, see BARRISTER, ADVOCATE, RIVER, MUSIC.

Bar, Serbian name of Antivari (q.v.).

Baraba', a steppe of Siberia, between the Obi and Irtish, occupies more than 100,000 sq. m.

Barabra, a Nubian people living on both sides of the Nile from Wady Halfa to Assuan, some 40,000 in number.

Baracoa, now a decayed seaport at the east end of Cuba (pop. 7000), once capital of the island.

Baraguay d'Hilliers, LOUIS (1764–1813), born at Paris, served under Napoleon in Egypt, Italy, and Germany, and commanded a division in the Russian campaign, but, incurring Napoleon's displeasure in the retreat, died at Berlin of fatigue and vexation.—His son ACHILLE (1795–1878) fought at Leipzig in 1815, commanded the Baltic expedition in 1854, was made a marshal after the capture of Bomarsund, and distinguished himself at Solferino.

Barante, AIMABLE GUILLAUME PROSPER BRUGIÈRE, BARON DE (1782–1866), born at Riom in Auvergne, held several administrative and diplomatic appointments, and after 1819 sat in the chamber of peers amongst the moderate Liberals. He wrote a history of French literature in the 18th century, and of the Valois Dukes of Burgundy.

Barataria (from Span. *barato*, part of a gamester's winnings given 'for luck' to bystanders), the so-called island assigned in *Don Quixote* to Sancho Panza as his government (see CERVANTES); also the retreat in the delta of the Mississippi, 40 miles S. of New Orleans, of a band of smugglers, slavers, and pirates under the notorious Jean Lafitte (1780–1826). Ostensibly they confined themselves to depredations on the shipping of the English and Spaniards, and they brought much booty to New Orleans, where it was disposed of by their accredited agents. Ultimately the band was broken up in 1814 by an American naval force under Commander D. J. Patterson. The pirate chief and some of his men volunteered to serve the U.S., and at New Orleans in 1815 fought bravely against the British.

Baratynski, JEVGENI ABRAMOVICH (1800–44), born at Tambov, was one of the corps of pages, but was dismissed for a boyish freak. Subsequently he served in the army in Finland, first as private then as officer, and became famous as a poet. One of his chief poems is on Finnish life, another on a gipsy subject. He was a friend of Pushkin.

Barb, a distinct variety of the Arabian horse, developed amongst the Moors of Barbary, and by them introduced into Spain; less noted for symmetry and beauty than speed and endurance. The 'Godolphin Arabian' (see HORSE) was properly a barb.

Barbados, or BARBADOES, in the Windward Islands, the most easterly of all the West Indies, is a British possession. It derives its name ('bearded') from the Portuguese word for the bearded fig (*Ficus barbata*), found abundantly on the island. The spelling Barbadoes, less correct than Barbados, became common from the time of such early English works as Ligon's *History of Barbadoes* (1657) and Phillips's *Journal of a Voyage to the Barbadoes* (1693–4), but has long been superseded by the official Barbados. The island lies 78 miles E. of St Vincent, in 13° 10′ N., and 59° 33′ W. Its length is 21 miles; its greatest breadth, 14½ miles; and its area, 166 sq. m., three-fourths being under cultivation (mostly sugar and cotton). At Bridgetown, the capital, is the open roadstead of Carlisle Bay, the only harbour, the island being almost encircled by coral-reefs, which here and there extend as much as 3 miles to seaward. Inside these reefs the coast, excepting at two points, presents long lines of sandy beach. The interior is generally hilly, Mount Hillaby, the loftiest summit, rising 1104 feet above sea-level. Setting aside occasional attacks of yellow-fever, leprosy, and elephantiasis ('Barbados leg'), the climate is healthy. The temperature is equable; and the average rainfall is 61·5 inches. Shocks of earthquake are sometimes felt, and thunderstorms are frequent and severe. But hurricanes are the grand scourge of Barbados.

In 1780 one of them destroyed 4326 persons, and property to the value of £1,320,564 sterling; and in 1831 another destroyed 1591 persons, and property to the value of £1,602,800 sterling. In 1780 the winds and the waves together carried a 12-pounder gun 140 yards. Another appalling and destructive hurricane ravaged Barbados and St Vincent in September 1898. In 1834, the first year of the apprenticeship under the imperial act of emancipation, the population was 102,000; by 1891 it had increased to 180,000; by 1911 it had fallen to 172,000 (about 20,000 white), and by 1921 to 159,000. Between 1833 and 1920 the revenue increased from £20,900 to more than £420,000 (the expenditure being somewhat less). There is some fishing. The exports are chiefly sugar, molasses, and cotton. Asphalt deposits are worked, and petroleum has been discovered. Everywhere cultivated in regular plantations, Barbados affords no room for the squatting of negroes on unreclaimed lands, as in Jamaica and other West India possessions. On this account, if from no other cause, the negroes have been compelled to labour diligently for hire, and are generally in a condition most creditable to their industry and prudence. Altogether the Barbadians are a shrewd and clever people. Barbados (which has never changed hands since it became English in 1605) was first colonised in 1625, having previously been depopulated by the Spaniards. It has a Governor, Executive Council, Legislative Council (appointed by the Crown), and elected House of Assembly. It was made the see of a bishop in 1824; and the bulk of the population are Anglicans. Codrington College (founded 1745; burned down 1926) is affiliated to Durham University. A railway (28 miles) runs from Bridgetown across the island and up the east coast.

See WEST INDIES; and Schomburgk's *History of Barbados* (1848); Stark's *Guide* (1893); Sinckler's *Barbados Handbook* (1912); Harlow's *History of Barbados* (1926).

Barbados Cherry, the name given in the West Indies to the fruit of two small trees, *Malpighia urens* and *M. glabra*, which are cultivated for its sake. The fruit of *M. urens* is small; that of *M. glabra* is like a Mayduke cherry in size and appearance, but inferior in flavour. Each fruit contains three stones. The leaves of *M. urens* have stinging hairs on the under side. See MALPIGHIACEÆ.

Barbados Gooseberry (*Peireskia aculeata*), a pleasant West Indian fruit, produced by a species of Cactus, with a round stem, thick flat alternate leaves, and large strong spines. The flowers are white and ornamental, and the fruit yellow; they are eaten fresh or preserved.

Barbados Leg, the same as *Elephantiasis Arabum;* see ELEPHANTIASIS.

Bar'bara, ST, suffered martyrdom at Nicomedia, in Bithynia, in 240 or 306. Her father, Dioscorus, a fanatical heathen, delivered her up to the governor, Martianus, who, struck with her intelligence and beauty, attempted first by arguments to make her relinquish Christianity, and when that failed, had recourse to the most exquisite tortures. At last, her father offered himself to behead her; scarce had he done so when he was struck with lightning. Hence St Barbara is to this day prayed to in storms, and is the patron saint of artillery, being represented in art with cannons, a tower, and a monstrance. Her festival is 4th December.

Barbara, Celarent, &c., mnemonic words used in logic to denote certain Syllogisms.

Barbare'a. See CRESS.

Barbarian (Gr. *barbaros*), among the Greeks, as early as the time of Homer, signified one who could not speak the Greek language; and this restricted signification was not wholly obsolete even in the age of Plato, for the latter divides the entire human race into *Hellēnes* and *Barbaroi*. Like the Latin *balbus*, the word is probably onomatopoetic, meant to represent a meaningless babble of sound, such as the Greeks conceived all foreign languages to be. It first began to acquire its secondary and invidious signification at the period of the Persian wars. The Greeks, who always exhibited a proud consciousness of their superior intellect and privileges, employed the term to designate the character of their enemies, as opposed to Greek civilisation, freedom, or intelligence. Subsequently, when Rome, under Augustus, became the mistress of the world, the word was applied to all the Germanic and Scythian tribes with whom she came into contact. In modern times, barbarian signifies savage, uncivilised, or ignorant.

Barbaros'sa. See FREDERICK I.

Barbarossa, HORUK and KHAIR-ED-DIN, two brothers, renegade Greeks, natives of Mitylene, who, as Turkish corsairs, were the terror of the Mediterranean during the first half of the 16th century. The former being invited to Algiers to aid against the Spaniards, treacherously murdered the Emir to whose assistance he had come, seized the town, and began to extend his conquests; but the Arabs summoned the Spaniards to their aid, and in 1518 he was captured and beheaded. The younger brother succeeded him in Algiers, and, having put himself under the protection of the Porte, fortified the town, and even conquered Tunis for the Turks. After Charles V. retook Tunis, Khair-ed-din preyed on the almost defenceless coasts of the Mediterranean, defeated the Christian powers in several sea-fights, and aided the French in taking Nice in 1543. Finally, with thousands of captives, he returned in triumph to Constantinople, where he died, July 4, 1546.

Barbaroux, CHARLES JEAN MARIE, one of the greatest of the Girondists, was born at Marseilles, 6th March 1767. At first an advocate and journalist at Marseilles, he was sent by that city to the Constituent Assembly at Paris. There he opposed the court party, and took part with the minister, Roland, then out of favour. After the events of the 10th of August 1792, he returned to his native town, where he was received with enthusiasm, and was soon after chosen delegate to the Convention. In the Convention he adhered to the Girondists, and belonged to the party who, at the trial of the king, voted for an appeal to the people. He boldly opposed the party of Marat and Robespierre, and even directly accused the latter of aiming at the dictatorship; consequently he was, in May 1793, proscribed as a royalist and an enemy of the republic. He fled to Calvados, and thence with a few friends to the Gironde, where he wandered about the country, hiding himself as he best could for about thirteen months. At last, on the point of being taken, he tried to shoot himself; but the shot miscarried, and he was guillotined at Bordeaux, June 25, 1794. This 'brave and beautiful young Spartan' was one of the great spirits of the revolution. There was no loftier-minded dreamer in the Girondist ranks; hardly a nobler head than his fell in that reign of terror. He was 'ripe in energy, not ripe in wisdom,' says Carlyle, or the history of France might have been different.

Bar'bary, an extensive region in Northern Africa, comprising the countries known in modern times under the names of Barca, Tripoli Proper, Fezzan, Tunis, Algeria, and Morocco; and in ancient times, under those of Mauritania, Numidia,

Africa Propria, and Cyrenaica. It stretches from Egypt to the Atlantic Ocean, and from the Mediterranean to the Desert of Sahara, or between 10° W. and 25° E. long., and 25° to 37° N. lat. The north-west of this region is divided by the Atlas Mountains into two parts. Though pertaining geographically to Africa, Barbary is not specially African in any of its characteristics; but in climate, flora, fauna, and geological configuration, belongs to that great region which forms the basin of the Mediterranean. Among the races, besides French and other Europeans, may be mentioned Berbers (Kabyles in Algeria), Moors, Arabs, Turks, Kuluglis (mixed Moors and Turks), Jews, and Negroes. The history of Barbary is a record of successive conquests by Romans, Vandals, Arabs, Turks, Spaniards (parts of Morocco), French (Algeria, 1830–37; Tunis, 1881; Morocco, 1904–14), and Italians (Tripoli, 1911). Under the Turks, Barbary was notorious for its pirates or Corsairs (q.v.), especially from the 16th, through the 17th, and into the 18th century. The Berbers, the earliest inhabitants known to history, have been overrun by the others; and the Mediterranean-European connections of this part of Africa have been recently emphasised by the view now largely held that they belong to the same ethnographical stock as the Basques in Spain and France, and other Iberians farther north; some connect them with the ancient Egyptian race. Recent Celtic philologists trace Basque, Berber, and even Egyptian influences on some of the neo-Celtic tongues. It is doubtful whether the old name *Barabara*, an ancient Egyptian word, was brought hither by the Arabs; later it was confused with the *Barbari*. See BARBARIAN; also BERBERS, AFRICA, ALGERIA, MOROCCO, TRIPOLI, TUNIS.

Barbary Ape (*Macacus inuus*), also called Pigmy Ape, Magot, and Macaque, a small tailless monkey, the only form now found in Europe, where it is restricted to a very few on the Rock of Gibraltar. Whether it is indigenous or not is uncertain. It is extremely abundant in some parts of North Africa, inhabiting rocky mountains and woods, passing from tree to tree with great agility, and

Barbary Ape.

often descending in herds to plunder gardens and plantations. It feeds on fruits, roots, &c.; and its fondness for eggs may have given rise to the ancient story of the battle of the pigmies and the cranes. It is yellowish-brown, paler underneath; and in size resembles a middle-sized dog. The characters generally agree with those of other macaques, differing most conspicuously in the stump-like rudiment of a tail, provided, however, with the usual muscles. The absence of tail and the length of the muzzle make the magot somewhat baboon-like. It usually walks on four feet, although it can be trained to stand or walk, in a more awkward manner, on two. It is filthy in its habits. Its anatomy was first studied by Galen in the 2d century, and the animal is thus of some historic interest, as it supplied him with an opportunity of understanding by analogy the anatomy of man when obscurantist regulations made the dissection of the human body all but impossible.

Barbastelle, a bat with hairy lips, a native of England. See BAT.

Barbastro, a town of Spain, in the province of Huesca, 44 miles NW. of Lerida by rail. It is situated on the Vero, and has a cathedral dating from the end of the 15th century. Population, 7000.

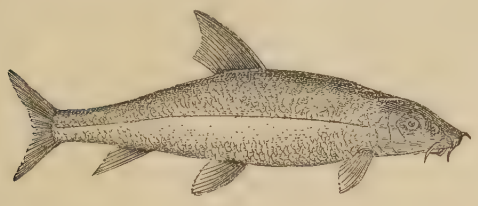
Barbauld, ANNA LETITIA, an English authoress, was born in 1743, at Kibworth-Harcourt, Leicestershire, where her father, the Rev. John Aikin, D.D., a dissenter, kept an academy. Her private education, the religious influence of her home, and her secluded life in the country, were well fitted to develop early her natural taste for poetry; but it was not until 1773 that she published her *Poems*, which ran through four editions in the twelvemonth. Encouraged by this, she the same year, conjointly with her brother, John Aikin (q.v.), published *Miscellaneous Pieces in Prose*. Next year she married the Rev. Rochemont Barbauld, a dissenting minister at Palgrave, Suffolk, in which village the newly married pair opened a boys' boarding-school, which was soon made celebrated by Mrs Barbauld's literary fame and assiduity. During the ten years spent here she published *Early Lessons for Children*, her best work; *Hymns in Prose*, and *Devotional Pieces*. In 1792 she commenced with the same brother the well-known series, *Evenings at Home*. In 1810 she published a collection of the British novelists, the task of editing which she had undertaken to divert her mind from the suicide of her husband two years before. Her last poetical effort was an ode, *Eighteen Hundred and Eleven*, in which she anticipated Macaulay's New Zealander. All her compositions are characterised by an old-world grace, an easy, flowing style, pure and elevated sentiment, and give token of a mind well versed in classical literature. She died at Stoke-Newington, 9th March 1825. See the Memoir by Lucy Aikin, prefixed to the collection of the *Works of A. L. Barbauld* (2 vols. 1825); the Lives by Mrs Le Breton (1874) and Grace Ellis (Boston, U.S. 1874); and Lady Richmond Ritchie's *Book of Sibyls* (1883).

Barbecue, the name given in America to a hog, ox, or any large animal broiled or roasted whole, and now applied in the United States to a large social entertainment, generally in the open air, where animals are roasted whole, and food and drink of all kinds provided on a generous scale.—The word is probably derived through the medium of Spanish from a Haitian *barbacòa*, 'a framework of sticks raised upon posts,' used for supporting above the fire meat that is to be smoked or dried.

Barbed, as a heraldic term, is applied to an arrow whose head is pointed and jagged; also to the five green leaves, or more properly sepals, which are shown between the five petals of the conventional Rose of Heraldry (q.v.).

Barbel (*Barbus*), a genus of fishes in the family of the Cyprinidæ (q.v.), differing from *Cyprinus* (Carp, Gold-fish, &c.) in the short dorsal and anal fins, in having one of the rays of the dorsal fin strong and serrated, and the mouth furnished with four soft tactile barbules (whence the name barbel, from Lat. *barba*, 'a beard'), two near the point of the snout, and one at each angle of the leathery mouth. The upper jaw also extends considerably beyond the lower. The species are very numerous. Like the other Cyprinidæ, they are all inhabitants of fresh water, and generally of muddy ponds and rivers, where they seek food, especially at night, by

ploughing up the mud with their snouts like swine, and are said often to seize the small fishes which come to share the worms and insects which they turn up. They also feed upon the leaves and roots of aquatic plants.—The Common Barbel (*B. vulgaris*) is abundant in many of the rivers of the



Barbel.

temperate parts of Europe, such as the Weser, Elbe, and Rhine. It is the only species found in Britain, and there only in some of the still and deep English rivers. It is very abundant in the Thames, frequenting the weedy parts of the river in shoals in summer, and seeking the deeper water in winter, becoming so torpid during cold weather, that the fishermen sometimes take it with the hand, or by pushing it with a pole into a small net fastened to an iron hoop. It grows to a large size, sometimes 3 feet in length, and 15 to 18 pounds in weight; it has a long shape, in section nearly circular; the general colour of the head and upper part of the body, greenish brown, becoming yellowish green on the sides, the belly white, the fins red, and the tail of a deep purple colour. It affords sport to anglers, and is much fished about London, but is a very coarse fish, and little used for food except by the poor, who often boil bacon with it to give it a relish. The flesh is said to be improved by being kept for some days in fresh water. The larger barbels are esteemed the best. The eggs, which are very numerous, are deposited in strings about stones, and the roe has poisonous qualities, although its effects are disagreeable rather than permanently injurious.—The Binny, or barbel of the Nile, is very abundant in that river; it attains a very great size, 70 lb. or upwards.

Barbellion, W. N. P. See CUMMINGS (BRUCE).

Barber, a shaver of the beard (Lat. *barba*), and usually also a hair-cutter. Barbers are of great antiquity; the office of the barber is referred to by the prophet Ezekiel (v. 1). In all oriental countries, including China, the shaving the whole or part of the head continues to be performed by barbers. In every part of the world, the professional barber and hairdresser is celebrated for his garrulity and general obliging qualities, such being required by those who place themselves in his hands. The amusing character of the barber in one of the tales in the *Arabian Nights*, and also of the barber in Rossini's *Barber of Seville*, will readily occur to recollection. Barbers at one time acted as a kind of surgeons, and accordingly occupied a higher social position than they now enjoy. Latterly, on account of the simple mode of trimming the hair, and of the prevalence of private shaving, the business of the barber in England has greatly declined, and his services are much more confined to the humbler classes. In the United States, the business of the barber is largely in the hands of the coloured population. Anciently, one of the utensils of the barber was a brass basin, with a semicircular gap in one side to compass a man's throat, by which means, in applying the lather to the face, the clothes were not soiled. Readers will recollect that Don Quixote assumed a barber's basin as a helmet—Mambrino's. At the end of a pole, the brass basin is still hung out as a sign at the door of the barber in Scotland, Germany, and other countries.

In former times, as already stated, barbers acted as a kind of surgeons, or at least phlebotomists, and such appears to have been the case in all countries. Till this day, on the barber's pole, there is represented a twisted or spiral ribbon, which symbolises the winding of a ribbon round the arm previous to blood-letting. In London, Edinburgh, and elsewhere, the barbers formed corporations with certain privileges. The surgical duties of these bodies now pertain to the corporations of surgeons. The Company of Barber-surgeons was first incorporated by Edward IV. in 1461; in 1540 its title was changed to 'Company of Barbers and Surgeons,' and the practitioners of 'barbary' were restricted to drawing of teeth. In 1745 an act was passed, from whose preamble we learn that the discovery had been made that the business or trade of a barber was 'foreign to, and independent of, the practice of surgery;' and it therefore dissolved the connection between the two bodies, and remitted the barbers to the more humble functions they now perform. But this is done with an express saving of all their privileges as a company or corporation, and as such they exist to the present day. The barbers still retain their ancient hall—which they possessed before the surgeons were disunited from them—in Monkwell Street, Cripplegate, in the city of London. See BEARD, GUILDS, SURGEONS; and *Annals of the Barber-Surgeons of London* (1890).

Barberini, an Italian family, originally of Tuscan origin, that acquired wealth by trade in the 16th century, and rose to the front rank among the Roman nobility and in the cardinalate. The family rose to power and influence on the elevation of Maffeo Barberini as Urban VIII. to the papal chair in 1623. His brother Carlo became general of the papal troops; while to a son of the latter, Taddeo, were given the principality of Palestrina and other fiefs. Francesco (1597–1679), brother of Taddeo, cardinal and vice-chancellor, was founder of the Barberini Library; another brother, Antonio (1608–71), was cardinal and high-chamberlain under Urban VIII. Their increasing power and grasping ambition excited the jealousy of the neighbouring princes, and led to the war (1641–44) in which Odoardo, Duke of Parma, defeated the papal troops. Under Urban's successor, Innocent X., proceedings were instituted against the Barberini, who fled to France; but returned again to Italy in 1652. The principality of Palestrina has belonged since 1630 to the family, while their palace at Rome—long the resting-place of the Portland Vase (q.v.)—gives evidence of their wealth and splendour. Barberino di Val-d'Elsa, a village near Florence, the birthplace of Urban VIII., gives name to the family, one of their palaces being here.

Barberry (*Berberis*), a genus of plants of the family Berberidaceæ (q.v.). The species, which are moderately numerous, and range through the temperate regions of the world, with the exception of Australia and South Africa, are shrubs with yellow flowers, having their parts usually in multiples of three. The stamens are sensitive, moving inwards when irritated, so as to dust the insect visitor with pollen, and so facilitate cross fertilisation. The fruit is a berry with two or three seeds. The genus is divided into two sections—those with simple leaves, whether deciduous or evergreen, forming the sub-genus Berberis proper, and those with pinnate evergreen leaves, the sub-genus Mahonia.—The Common Barberry (*B. vulgaris*) is a native of the Palæarctic region, but has been

introduced into the United States; it is a very ornamental shrub, especially when covered with its brightly coloured berries. The fruit of the ordinary varieties is too acid to be eaten, but makes excellent preserves and jelly, and is also a convenient source of malic acid. Although an

a, Flowering branch, and *b*, fruit, of Common Barberry (*Berberis vulgaris*);
c, Branch in fruit of *B. Darwinii*.

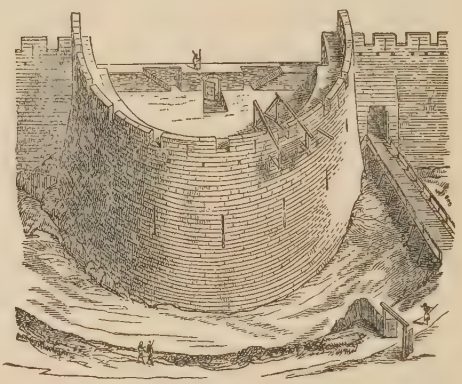
excellent hedge-plant, its extirpation in such localities is advisable, since (as was indeed suspected by agriculturists long before it was demonstrated by De Bary) it furnishes the intermediate host for the 'æcidium-stage' of the fungus which occasions the *rust* of wheat (see RUST). The yellow root and bark has been used in dyeing, and numerous species are so employed in Chile and Peru, and in the Himalayas; the astringent bark has also been used in tanning. *B. Lycium* is peculiarly astringent, and its extract is employed in North India in ophthalmia. *B. buxifolia*, the Sweet Barberry, is a native of Chile; its fruits resemble in size and colour those of the black currant. Wholesome and pleasant fruits are produced also by *B. aristata* and *B. asiatica*, the berries of both of which are dried in Nepal, after the manner of raisins, and by several other species; but more frequently they are insipid or harsh, especially in *Mahonia*. New species and varieties are frequently introduced, and are ornamental, easily cultivated additions to the shrubbery.

Barberton, a mining-town of the Transvaal, at the De Kaap gold-fields. It is situated at the base of a high range of hills 2500 feet above sea-level, 180 miles E. of Pretoria, and 100 NW. of Delagoa Bay, with both of which it is connected by railway (a branch-line constructed in 1894–95). In 1886–87, owing to the discovery of rich gold reefs, there was a 'rush' to the place, and the population soon rose to 8000 or more; but the superior attractions of the Witwatersrandt reefs and the growth of Johannesburg soon reduced Barberton to a place of 2500 inhabitants.

Barbet, a name applied to birds of the family Capitonidæ, allied to woodpeckers and toucans. The bill is large and stout, and generally bears strong bristles, to which the name refers. The plumage is usually brilliant. The barbets are strictly arboreal birds, somewhat sluggish in habit, feeding chiefly on insects, buds, and fruits, and nesting like woodpeckers. They are widely represented in forest-country in tropical Asia, Africa, and America. Their ringing metallic note is suggested by many of their popular names—'Copper-smith' (*Xantholäema*), 'Iron-smith' (*Cyanops*), 'Tinker-bird' (*Barbatula*).

Barbey d'Aurevilly, JULES (1808–89), novelist and critic, was born at Saint-Sauveur-le-Vicomte, Manche, settled in Paris, and contributed literary articles to the *Pays* and other papers. Among his most notable novels—often *risqués*, ultra-Catholic, and Byronic-romantic at once—were *Une Vieille Maîtresse*, *L'Ensorcelée*, *Chevalier Destouches*, *Les Diaboliques* (shorter stories). Other works were *Les Romanciers* and *Goethe et Diderot*. See books on him by Grélé, Clerget, and Seillière, and Gosse's *French Profiles* (1895).

Barbican (Old Fr. *barbacane*, also in Spanish, Portuguese, and Italian forms; perhaps of Arabic or Persian origin—Colonel Yule suggests *bāb-khānah*, 'gate-house,' the usual name in the East for a towered gateway), a projecting watch-tower over the gate of a castle or fortified town. The term barbican was more specially applied to the outwork, intended to defend the drawbridge, which



Barbican at Carcassonne.

in modern fortifications is called the *tête du pont*. There are a few perfect barbicans remaining in England, as at Alnwick and Warwick; but the best example of one, as well as of the other parts of the fortification of the middle ages, is probably to be seen at Carcassonne. The street called Barbican in London, near Aldersgate Street, marks the site of such a work, in front of one of the gates of the old city.

Barbier, (1) ANTOINE ALEXANDRE, a French bibliographer, born at Coulommiers, January 11, 1765. Bred to the church, he subsequently left his curacy, married, and in 1794 removed to Paris, where he was appointed to collect and place in the public libraries the books of the suppressed monasteries. In 1798 he became librarian to the Directory, and as private librarian to Napoleon (1807), founded the libraries of Fontainebleau, Compiègne, St Cloud, and the Louvre. He held the same appointment under the Bourbons until 1822, and died in Paris, December 5, 1825. His most important work is his *Dictionnaire des Ouvrages Anonymes et Pseudonymes* (Paris, 1806–9; 3d ed. 4 vols. 1872–79).—(2) HENRI AUGUSTE, a French satirist, born at Paris, April 28, 1805. Abandoning the bar for a literary career, he made a first venture with an historical novel, but the Revolution of July 1830 led him to make his first essay in the field of satirical poetry. His satires of this period are collected in a volume entitled *Iambes* (1831), which has been so popular that a 31st edition appeared in 1882. His subjects include office-seeking and the greed and ambition

of public men, the corruption of public morals, and the mania for committing suicide. But his later works show an astonishing falling off, and are all distinctly inferior to his earlier efforts. The list includes *Il Pianto* and *Lazare*, republished together (1837) under the title *Satires et Poëmes; Pot-de-Vin* (1840), *Rimes Héroïques* (1843), a metrical translation of Shakespeare's *Julius Cæsar* (1848), *Silves, Poésies Diverses* (1864), *Satires* (1865), a volume of romances, *Trois Passions* (1867), and his posthumous *Souvenirs* (1883) and *Poésies* (1884); but in none can the brilliant author of *Iambes* be recognised. He was elected to the French Academy in 1869, and died February 14, 1882.—(3) PAUL JULES (1825–1901), born at Paris, wrote dramas, comedies, and vaudevilles, and many libretti.

Barbitone. See VERONAL.

Bar'bizon, a village on the skirts of the forest of Fontainebleau, a great artists' resort, the home of Millet; Corot, Diaz, Daubigny, and Rousseau were also of the 'Barbizon school' of painters. See D. C. Thomson, *The Barbizon School* (1891).

Barbou, the name of a celebrated French family of printers, the descendants of Jean Barbou of Lyons, who lived in the 16th century. From his press issued the beautiful edition of the works of Clément Marot in 1539. His son, Hugues Barbou, removed from Lyons to Limoges, where, among other works, his celebrated edition of *Cicero's Letters to Atticus* appeared in 1580. Joseph Gérard Barbou, a descendant of the same family, settled in Paris, and continued in 1755 the series of Latin classics in duodecimo—rivals to the Elzevirs of an earlier date—which had been begun in 1743 by Coustelier. This series of classics is much prized for its elegance and correctness.

Barbour, JOHN, the father of Scottish poetry and history, regarding whose life but little is on record beyond the production of the national epic, *The Brus*. Nothing is known of his parentage, and of his birth it can only be conjectured to have been about 1316. The ascertained facts of his life are few. We are informed only that in his own age he was accounted a man of great learning and worth; that he was Archdeacon of Aberdeen as early at least as 1357, and held that office till his death in 1395; that in 1357 he travelled into England, accompanied by three scholars, for the purpose of studying at Oxford; that he repeated his visit to England for the same purpose in 1364; that in 1365 he obtained a passport 'to travel through England with six companions on horseback towards St Denis and other sacred places;' that in 1368 he again received permission to travel through England with two servants and two horses, on his way to France; that in 1373 he was clerk of audit to the household of King Robert II., and one of the auditors of exchequer; that in 1375 his great poem was more than half finished; that in 1377 he had a gratuity of ten pounds from the king; that in 1378 he received a perpetual annuity of twenty shillings, which in 1380 he bequeathed to the dean and chapter of Aberdeen, under the condition that they should sing a yearly mass for the repose of his soul; that in 1381 he had a gift from the crown of the ward of a minor, whose estate lay within the parish of which he was rector; that in 1382, and again in 1384, he was one of the auditors of exchequer; that in 1388 a further pension was granted him of ten pounds a year; and that he died on 13th March 1395, his anniversary in the cathedral of Aberdeen being celebrated on that day until the Reformation. Besides *The Brus*, Barbour wrote, according to Wyntoun, a poem on the Brutus legend and *The Stewarts' Original*, both lost. It is disputed whether he is the author of the Troy-book fragments, or of *The Legends of the Saints*, both discovered by Bradshaw at Cambridge, or of *The Buik of Alexander* (from the French). Modelled on Statius, *The Brus* is distinguished by great purity and clearness of style. Barbour's imagery is not rich, but he is seldom other than lively, simple, and energetic. He has depicted, in rough but faithful outline, the life, manners, and deeds of a truly heroic age, and given to his country almost the first poem in her literature, and the earliest history of her greatest king.

The Brus, printed at Edinburgh in 1571, was edited by Dr Jamieson in 1820; by Cosmo Innes, for the Spalding Club, in 1856; by Skeat (E.E.T.S. 1870-77, and S.T.S. 1893-94); and by G. W. Mackenzie in 1909. Of the *Legends of the Saints*, still claimed for him by Dr G. Neilson in *John Barbour, Translator and Poet* (1900), there is an edition by Horstmann (Heilbronn, 1881-82), with the Troy fragments, and one by Metcalfe (Scot. Text Soc., 1887-89); and of the *Alexander* by Ritchie (S.T.S., 4 vols. 1921 *et seq.*; with the French originals).

Barbu'da, a West Indian island, 30 miles N. of Antigua, of which it is a dependency. It is 10 miles long by 8 broad, with an area of 60 sq. m. A reef-surrounded coral island, it is fertile, but the greater part of the interior is a dense forest.

Barbusse, HENRI, French man of letters, born at Asnières (Seine) in 1874, fought valiantly in the Great War. He wrote *Pleureuses* (poems; 1895), *Les Suppliants* (1903), *L'Enfer* (1908), *Nous Autres* (1914), *Le Feu* (an indictment of war, in form of a novel; 1916), *Clarté* (1918), &c.

Barby, a town of Prussian Saxony, on the left bank of the Elbe, 15 miles SE. of Magdeburg. It is well built, and has an old castle. Pop. 5000, engaged in sugar-refining, ship-building, copper industry, and river navigation.

Barca, a country of North Africa, between the Gulf of Sidra and Egypt, nearly corresponds with the ancient Cyrenaica (q.v.). Much of it is a high plateau. The climate is healthy and agreeable in the more elevated parts, which reach a height of almost 2000 feet, and in those exposed to the sea-breeze. There are none but small streams, but the narrow terrace-like tracts of country are extremely fertile, realising all that is said of the ancient Cyrenaica. Rice, dates, olives, saffron, &c. are produced in plenty. The pastures are excellent; the horses still celebrated, as in ancient times. But the good soil extends over only about a fourth of Barca: the east exhibits only naked rocks and loose sand. Many ruins in the north-western parts attest its high state of cultivation in ancient times, when its five prosperous cities bore the title of the Libyan Pentapolis. So early as the time of Cyrus, Barca became a state, which proved dangerous to the neighbouring state of Cyrene; erelong it became subject to Egypt. The Arabs took it from the Eastern Empire in A.D. 641. With Tripoli (q.v.) it fell under the Turks in the 16th century, being sometimes treated as a separate province; and with Tripoli it was occupied by the Italians in October 1911. It now forms the Cyrenaica district of Libia Italiana. Pop. 400,000, Berbers, Arabs, Turks, Italians, and Greeks. The province is sometimes named after the capital, Bengazi (q.v.). The old city of Barca, inland from Bengazi, is now represented by the village of Merj.

Barcarolle (Ital. *barcaruola*, 'a boat-song'), a species of song supposed to have originated amongst the gondoliers of Venice, having a simple, regular melody, in a rhythm corresponding to the stroke of the oar. The name is applied to musical compositions for voice or pianoforte of a similar character; and its form has been freely used by Auber, Mendelssohn, and Chopin.

Barcello'na, a town of Sicily, in the province of Messina, and 20 miles from the city of Messina. The commune consists of Barcellona and Pozzo di Gotto, standing close together, and separated only by a small stream; pop. (1921) 23,764. Barcellona is situated in a broad plain, between the mountains and the sea, abounding in corn, wine, oil, and fruit, and has silk manufactures and sulphur-baths.

Barcelo'na, the second largest and the most important manufacturing city in Spain, in the province of the same name, is beautifully situated on the Mediterranean between the mouths of the Llobregat and the Besos, in the midst of a district as luxuriant as a garden. By rail it is 228 miles E. of Saragossa and 439 ENE. of Madrid. The ramparts and citadel have given place to the expansion of the city, and the ground formerly covered by the citadel has been laid out in gardens. The castle of Montjuich, on a hill 735 feet high, commands the town from the south, and the arsenals near by comprise infantry and cavalry barracks. Barcelona is divided into two parts—the old town and the new—by the *Rambla* (river-bed), which has been formed into a beautiful promenade. There is another fine promenade, the Muralla del Mar, or sea-wall. The streets of the old town, forming the north-west division, are crooked, narrow, and ill paved. The buildings are chiefly of brick, four or five stories high, with flat roofs. Those of the new are much more modern in appearance, spacious, and regular. There is a large suburb to the SE. of the town, called Barceloneta, where the seafaring portion of the population chiefly reside. The suburbs of Gracia, to the NW., and Sarria are favourite holiday and summer evening resorts of the inhabitants. Barcelona is the see of a bishop. It has a university (1430; rebuilt 1873), and colleges and schools; public libraries, in one of which there is a splendid collection of MSS.; several hospitals and other charitable institutions; theatres, one of them capable of holding 4000 spectators; numerous ancient and elegant churches and convents, including the fine massive Gothic cathedral (1298–1448) with some good stained glass, and the Gothic church of Santa Maria del Mar (1329–84); the palace of the kings of Aragon (13th century, now an archæological museum) and other palaces; the town-hall (14th century), the provincial law-courts (15th–16th centuries, formerly the parliament house of Catalonia) and other fine municipal buildings. The modern 20th-century architecture, including a cathedral as yet unfinished, is eclectic. Barcelona's textile and engineering industries are very important. Of the former, cotton is the greatest. Coal is expensive, but electricity is obtained from the waterfalls of the Pyrenees. The staple imports are coal, raw cotton, coffee, sugar, and other colonial produce. Its export trade includes textiles, fruits, vegetables, wines, oil, and salt. It is the most important port in Spain. The extended port in 1913 had quays 2½ miles in length, with an area of 186,500 square yards. From of old it was a famous port—the *Consolato del Mare* was promulgated here in 1494 (see MERCANTILE LAW); but great engineering skill and constant dredging were required to convert the open roadstead into a safe harbour. The city, which is the most autonomous municipality in Spain, freely electing its council, and the council the *alcalde*, has often been the headquarters of Carlist, republican, and anarchist movements. Barcelona has excellent railway and steamship communication. In 1864 the population was 190,000; in 1868 it had been reduced (mainly by cholera) to 167,095; (1878) 249,106; (1887) 268,223; (1910) 560,000; (1920) 710,335. It is the headquarters of Catalan literature and Catalan art, and has more scientific institutes than any other Spanish town but Madrid.—The province of Barcelona has an area of 3000 sq. m., and a population of 1,300,000.

Barcelona is a place of great antiquity, and associated with many historical events. Local tradition fixes the date of its foundation 400 years before the Romans; and it is said to have been refounded by Hamilcar Barca, the father of Hannibal, from whom its ancient name, Barcino, was derived. An important city under the Romans, Goths, and Moors, Barcelona in 878 became an independent sovereignty, under a Christian chief of its own, whose descendants continued to govern it, and to hold the title of Counts of Barcelona until the 12th century, when its ruler adopted the title of King of Aragon, to which kingdom it was annexed. During the middle ages, Barcelona became a flourishing seaport, rivalled in the Mediterranean by Genoa only. To its commercial code, framed in the 13th century, much deference was paid by the whole of Europe; and it was at this time 'a city of commerce, conquest, and courtiers; of taste, learning, and luxury; and the Athens of the troubadour.' It was one of the first cities of Spain into which printing was introduced. Columbus was received here in 1493 by Ferdinand and Isabella, after his discovery of America. Here also a ship was launched in 1543, which was moved by means of steam. In 1640 it appealed to France against the tyranny of Philip IV.; but it turned against that country in the war of the Spanish Succession, and adhered to Austria. In 1705 the fortress of Montjuich was surprised and captured by Lord Peterborough, and the city surrendered shortly afterwards. In 1714, after a most heroic defence, it was stormed by the Duke of Berwick, on behalf of Louis XIV., and given over to fire and sword. Napoleon perfidiously obtained possession of it in 1808; and with one or two reverses, and in the face of great difficulties, it was held by the French until the treaty of peace concluded in Paris in 1814. For 13 years, Barcelona remained quiet under the iron rule of España; but in 1827 its old turbulent spirit returned, and it rose in favour of Don Carlos. A Progressist rebellion in 1856 caused much bloodshed, and in 1874 the Federalists raised an insurrection here. During the 20th century strikes have been numerous and notable, and the Separatist movement has grown apace. So has the town's trade.

Barcelona, formerly New Barcelona, a town of Venezuela, stands near the mouth of the Neveri, 160 miles E. of Carácas. The surrounding country is fertile, but Barcelona is very unhealthy. Cattle, jerked-beef, hides, indigo, cotton, and cacao are the chief exports. Coal and salt are mined. Pop. 10,000.

Barcelona Nuts. See HAZEL.

Barcidæ. See HAMILCAR, HANNIBAL.

Barclay, ALEXANDER, poet and prose-writer, was born about 1475, most probably in Scotland. He may have studied at either or both of the English universities, and then travelled in France and Italy. Some time before 1508 he was appointed, through Bishop Cornish, a priest of Ottery St Mary, Devonshire. About 1511 he became a monk of the Benedictine monastery of Ely; later he assumed the Franciscan habit at Canterbury; and he died at Croydon in June 1552, six weeks after he had been presented to the rectory of All-Hallows, London. His claim to notice rests chiefly upon his famous poem, *The Shyp of Folys of the Worlde*—partly a translation, and partly an imitation of the German *Narrenschiff* by Sebastian Brandt (q.v.)—printed by Pynson in 1509. He also published *The Castell of Laboure*, *The Egloges* (Eclogues), a translation of Sallust's *History of the Jugurthine War*, &c. See the admirable edition of the *Shyp of Folys* by T. H. Jamieson (2 vols. Edin. 1874).

Barclay, JOHN, author of the *Argenis*, was born in 1582, at Pont-à-Mousson in Lorraine, where his father, a Scotsman, was professor of Law. Owing, it is said, to persecution on the part of the Jesuits, he came with his father to England about 1603, and either in that year, or two years later, he published his *Euphormionis Satyricon*, a politico-satirical romance, chiefly directed against the Jesuits, supplements to which were the second part (1607), the *Apologia* (1611), and the *Icon Animorum* (1614). In 1616 he left England, and went to Rome, where he died, a good Catholic, in 1621. In the same year appeared his *Argenis*, according to Cowper, 'the best romance that ever was written.' It was written in Latin, and has been translated into Spanish, Italian, Polish, &c. There are no fewer than three English versions, the last by Clara Reeve in 1772. It is a political allegory, containing clever allusions to the state of Europe, more particularly of France, during the time of the League; and has merited the admiration of readers as dissimilar as Richelieu, Leibnitz, and Coleridge. See Dupond, *L'Argénis de Barclai* (1875), and the bibliography by Dukas (1880).

Barclay, JOHN, M.D., anatomist, was born 10th December 1758, in Perthshire, Scotland, and died in Edinburgh, 21st August 1826. He was educated at St Andrews, and studied for the ministry, but afterwards devoted himself to medicine. He obtained the degree of M.D. from the university of Edinburgh in 1796, where he became a private lecturer, and in 1804 he was formally recognised as lecturer on anatomy and surgery by the College of Surgeons. He was mainly instrumental in founding the Dick Veterinary College in Edinburgh. He published between 1803 and 1822, *A New Anatomical Nomenclature, Muscular Motions, Arteries of the Human Body*, and *An Inquiry into the Opinions concerning Life and Organisation.*

Barclay, REV. JOHN (1734–98), the founder of the Bereans (q.v.), was an uncle of the preceding.

Barclay, ROBERT, the celebrated apologist of the Quakers, was born at Gordonstown in Morayshire, December 23, 1648. His father belonged to an old Scottish family, had served under Gustavus Adolphus, and was in some trouble after the Restoration for his conformity with Cromwell. Robert was educated at the Scots College at Paris, of which his uncle was rector; and here he withstood every temptation to embrace the Roman Catholic religion, and returned to Scotland in 1664, in compliance with the wish his mother had expressed on her death-bed. In 1667 he followed the example of his father—a convert in 1666—and joined the Society of Friends, for reasons more highly respected in our day than in his own. He states in his *Treatise on Universal Love*, that his 'first education fell among the strictest sort of Calvinists,' those of his country 'surpassing in the heat of zeal not only Geneva, from whence they derive their pedigree, but all the other so-called reformed churches;' that shortly afterwards, his crossing to France had thrown him among the opposite 'sect of papists,' whom, after a time, he found to be no less deficient in charity than the other; and that, consequently, he had refrained from joining any, though he had listened to several. The ultimate effect of this was to liberalise his mind, by convincing him of the folly and wickedness of religious strife. In both Calvinists and Catholics he found an absence of 'the principles of love,' 'a straitness of doctrine,' and a 'practice of persecution,' which offended his idea of Christianity, as well as the gentleness and generosity of his nature. He therefore allied himself gladly to this new sect, whose distinguishing feature was its charity and pure simplicity of Christian life, and soon became one of its most devoted adherents and its ablest advocate. He continued to prosecute his studies ardently, married Christian Mollison in 1670, and became involved in controversies in which he showed his superiority in logic and learning, no less than in tolerance. In 1672 he startled the self-complacent city of Aberdeen by walking through its streets in sackcloth and ashes. He suffered much persecution, and was frequently imprisoned, but at last found protection in the favour of the Duke of York, afterwards James II. He made several journeys into Holland and Germany, the last in company with William Penn and George Fox. He was one of the Quakers—originally twelve in number—who acquired the proprietorship of East New Jersey (in which toleration was to be established) in 1682 and was appointed its nominal governor. He was a frequent visitor to London, but continued to live at Urie, where he died, leaving three sons and four daughters, October 3, 1690. His estate remained in his family till the death of Captain Barclay, the famous pedestrian, in 1854. Barclay's works were collected in 1692 in a folio volume, entitled *Truth Triumphant*, republished in 3 vols. in 1717–18. Of these the greatest is *An Apology for the True Christian Divinity, as the same is held forth and preached by the People called in scorn Quakers* (1678). It contains a statement and defence of fifteen religious propositions peculiar to the Friends. The leading doctrine which runs through the whole book is, that divine truth is made known to us not by logical investigation, but by intuition or immediate divine revelation to the heart of the individual; and that the faculty by which such intuition is rendered possible is the 'internal light,' the source of which is God, or, more properly, Christ, 'who is the light that lighteth every man that cometh into the world.' This light is given to every man, but is obscured by human corruption. The authority of the Scriptures gives only a 'secondary rule,' subordinate to that of the inward light, and the ordinary Augustinian notions of justification, perfection, and perseverance, imply rather a change in the outward relations than a transformation of the soul that accepts the divine light. The identity of this in the main with the teaching of a large school within the English church of the present day, is obvious. The fourteenth proposition deals with the question of toleration and the right of freedom for the conscience, his assertion of which fits well with his theory of divine light within all men of whatever creed or country. The author distinguishes carefully between the divine light and natural reason; but others who identify the two, find in Barclay's great work a series of excellent arguments for deism. Indeed, he was accused of deism even in his own time, and he is mentioned with favour by Voltaire. Brown of Wamphray, in his *Quakerism the Pathway to Paganism* (1678), denounces the 'hellish neo-paganism' of this 'devil in Samuel's mantle,' and speaks of his 'serpentine venome' as 'sugared over with fair speeches.' Barclay's famous work has often been reprinted, and has been translated into most of the European languages. His *Treatise on Universal Love* (1677) was the first of that long series of noble and gentle remonstrances against the criminality of war that has so honourably distinguished the Society of Friends.

Barclay-Allardice, ROBERT, known as Captain Barclay, the pedestrian, was born in 1779, and succeeded to the estate of Urie, near Stonehaven, in 1797. He entered the army (1805), and served in the Walcheren expedition (1809), but afterwards devoted himself to agriculture, cattle-breeding, and the claiming of earldoms (Airth, Strathearn, and

Menteith). He died 8th May 1854. His great feat of walking 1000 miles in 1000 consecutive hours took place at Newmarket in June to July 1809. See W. Thom's *Pedestrianism* (1813).

Barclay de Tolly, MICHAEL, PRINCE, a famous Russian general, was born in 1761 in Livonia. He was descended from the same Scottish family to which John Barclay the poet and the Quaker apologist both belonged, two of the branches of which had settled in Mecklenburg and Livonia. Entering a Russian regiment of cuirassiers as a sergeant, he fought with great bravery in the Turkish war of 1788–89, in the campaign against Sweden in 1790, and in those against Poland in 1792 and 1794, and rose rapidly in rank. He commanded Benningsen's advanced-guard at Pultusk in 1806; and lost an arm at the battle of Eylau. Scarce recovered from his wound, he took part in the war in Finland, defeated the Swedes, crossed the Gulf of Bothnia on the ice at the head of 6000 men, and quickly forced the enemy to sue for peace. Spite of his unpopularity as a German with the Russian national party, he was appointed minister of war by the Emperor Alexander in 1810—an office which he held till 1813. In 1812 he was made commander-in-chief of the army of the west. Here, though face to face with the greatest general and one of the finest armies of modern times, he showed himself such a consummate tactician that his defeats never became disasters. The plan of defence during the campaign is generally ascribed to his insight and wisdom. His advice was to avoid battles and retreat into the interior before the French, leaving the country behind them a desert, and thus the Russian army would ever become stronger as the French grew weaker. He had offered the same advice after Eylau in 1807, but Bagration, the impetuous leader of the second army, was eager to assume an offensive attitude, and the army, weary of constant retreat, supported him against his more cautious colleague. Accordingly, Barclay de Tolly was forced to give battle at Smolensk, and in consequence of his defeat had to yield the supreme command to Kutusow until the death of the latter gave it to him again. At Moskwa he commanded the right wing; at Bautzen he commanded the entire army. He afterwards commanded the Russian army in Bohemia, and took part in the battles of Dresden, Kulm, and Leipzig. He was commander-in-chief of the Russian army in France, and in consequence of this was made a prince and a field-marshal. He died 14th May 1818, at Insterburg, on his way to the Bohemian baths. Two or three years before his death, the estate of Tolly or Towie-Barclay, in Aberdeenshire, the old inheritance of his family, was for sale, but he refused to buy it on the ground that his family had been so long expatriated that Scotland was now to them a strange country. Statues of him were erected at St Petersburg in 1837, and at Dorpat in 1846.

Bar-cochba, SIMON, the leader of the Jews in their great insurrection against the Romans, under the Emperor Hadrian, from 131–135 A.D. Three times had the oppressed Jews revolted without success, from 115 to 118; and in 130, soon after Hadrian's return from Syria, a new rebellion broke out, for which they had been secretly preparing. At the head of it was one Simon, who assumed the name of Bar-cochba—i.e. 'Son of the Star,' pretending that the prophecy was to be fulfilled in him, 'There shall come a Star out of Jacob' (Numb. xxiv. 17). He fought at first with great success against the Romans, and even obliged them to evacuate Jerusalem, where he was proclaimed king, and caused coins to be struck with his name. The war spread over all the country of Palestine, and fifty towns, besides many villages and hamlets, came into the possession of the Jews. But on the arrival of Hadrian's general, Julius Severus, Jerusalem was retaken; and in August 135, Bether, the very last strong fortress held by the Jews, was stormed by the Romans. Bar-cochba fell on the day of this bloody conquest. Many thousands of Jews perished in this last attempt to regain political independence, and many were executed after its failure. From this last fatal struggle dates the final dispersion of the Jews over the face of the earth.

Bard, a fortress and village in the Italian province of Turin, situated on the left bank of the Dora Baltea, about 23 miles SE. of Aosta. When the French crossed the St Bernard in 1800, the fortress of Bard, manned by 400 Austrians, maintained for ten days a resistance to their further advance into Italy. Ultimately Napoleon contrived to elude the vigilance of the garrison, and passed by a mountain-track during the night. Bard was taken a short time after by the French, and razed, but it was afterwards rebuilt.

Bard, horse armour of metal plates; also plate-armour for a man-at-arms.

Bard, the name, known to the Romans since 200 B.C., by which the Gauls and other Celts designated their minstrels. Like the Scôps of the Anglo-Saxons, and the Skalds of Scandinavia, the bards celebrated the deeds of gods and heroes at religious solemnities, and the festivities of princes and nobles, accompanying their recitations with the harp or Crwth (q.v.); they excited the armies to bravery, preceded them into the fight, and formed the heralds of princes and the mediators of peace. The institution early disappeared among the Gauls, but lingered long in Wales, Ireland, and Scotland. The bards formed a hereditary order, and exercised a decided national influence. The minstrels among the Celts, as among the Germans, were the organ of the people, and the channel of all historical tradition. It is supposed that in Wales, about 940 A.D., their privileges were defined and fixed by the laws which bear the name of King Howel Dha; and in 1078 the whole order is said to have been reformed and regulated anew by Gryffith ap Conan. At Caerwys, Aberfraw, and Mathraval, there were held from time to time great competitions in minstrelsy, called Eisteddfods (q.v.), at which the judges were appointed by the prince. When Wales was conquered by Edward I. (1284), the bards lost their privileges, and were, according to tradition, persecuted and put to death; but succeeding princes countenanced the institution, and Eisteddfods were repeatedly held under royal commission down to the reign of Elizabeth. See WALES (*Welsh Language and Literature*).

In Ireland, the bards are believed to have been a hereditary guild, divided into three classes—the *Filedha*, who sung in the service of religion and in war, and were the counsellors and heralds of princes; the *Breitheamhaim*, who recited or chanted the laws; the *Seanachaidhe*, who were chroniclers and genealogists to princes and nobles. Their ample privileges and endowments of land gave them an exorbitant influence, which both princes and people had sometimes to rise against and curb. The great skill of the Irish bards on the harp was acknowledged everywhere. After the conquest of Ireland by Henry II., the profession began to sink. Still many of the chiefs maintained bards in their families, whose songs and legends kept up the national feeling. This occasioned several measures of the English rulers against the Irish bards; Elizabeth ordered the bards that were captured to be hanged, as the instigators of rebellion. Turlough O'Carolan, born 1670, died 1737, is reckoned the

last Irish bard; his poems were translated into English by Furlory. Other lays of the bards were translated by Miss Brooke, *Relics of Irish Poetry* (1789) and Hardiman, *Irish Minstrelsy* (1831). See Douglas Hyde's *Literary History of Ireland* (1899).

The bardism of Scotland may be conjectured to have been similar to that of Ireland; but little is certainly known of the subject beyond the fact that there were poets or bards of different degrees in the Highlands down to the 17th century. In various Scottish enactments from 1449 onwards, bards were coupled with 'sorners' and 'masterful beggars,' as liable to hanging or burning on the cheek.

The name of bard was unknown among the Germanic nations; though a corrupt reading in some MSS. of the *Germania* of Tacitus (*barditus* for *baritus*, 'war-cry') led Klopstock and others to write wild religious and war songs, which they called 'bardeits,' under the notion that they were restoring a branch of the national literature.

Bardesa'nes (properly, Bar-Daisan), a Syrian, the 'last of the Gnostics,' was born at Edessa in 154, and died in 222. He diffused his opinions through the medium of hymns, of which he is reckoned the earliest writer in Syria. These hymns, fragments of which are still extant, exhibit a rich and pure fancy. His *Gnosis* was not purely dualistic. He did not consider evil the eternal coefficient of good, but merely the result of a temporary reaction of matter on spirit. Yet, inexplicably enough, he maintained the devil to be a self-existent, independent being. He denied the doctrine of the resurrection of the body, and in conformity with such a conviction, asserted that Christ's body was not real, but only an illusive image brought down from heaven. See Hilgenfeld's *Bardesanes* (1864).

Bardsey, an island of Carnarvon, off Braich-y-Pwll, 2 miles long, with a ruined monastery, once a place of pilgrimage where twenty thousand saints are reckoned to have been buried.

Bardwan', or BURDWAN (but correctly Bardhamâna), a city of Bengal, 67 miles from Calcutta, headquarters of a district of the same name. It contains a palace of the Maharajas, and a large collection of temples. The Maharaj-adhiraj Bahadur is the largest land-revenue payer in India. The incidence of the land revenue on his estate is specially high for Bengal. Pop. (1921) 34,616.—The district has an area of 2700 sq. m., and a population of 1,500,000 inhabitants. It exports silk, rice, tobacco, jute, also iron and coal—the latter chiefly brought from the mines of Raniganj. Since the opening of the East Indian Railway, many small villages have been transformed into thriving centres of trade. The *division* of Bardwan (headquarters at Chinsura) has an area of 14,000 sq. m., and a population of about eight millions.

Barebone's Parliament, the 'Little Parliament' summoned by Oliver Cromwell, met 4th July 1653, and was so nicknamed from one of its members, Praise (*not* Praise-God) Barbon or Barebone (*c.* 1596–1679), a leather merchant. It consisted of 139 persons, 'faithful, fearing God, and hating covetousness,' mostly of very thoroughgoing social principles. These began by abolishing the Court of Chancery, and were proceeding to abolish tithes, to the alarm of the more moderate members, and of Cromwell himself, who dissolved the parliament on 12th December of the same year.

Barèges, a small watering-place, tourist and winter sports centre in France, in the department of Hautes-Pyrénées, about 12 miles SE. of Pierrefitte railway station. Situated at a height of over 4000 feet above the sea, great part of it is buried in snow throughout the winter, consequently few live here save in summer and autumn. The mineral water for which it is celebrated contains principally sulphide of sodium, with portions of carbonate, chloride, and sulphate of sodium, nitrogen, and sulphuretted hydrogen. Its efficacy in the cure of wounds, rheumatism, stiffness of joints, and diseases of the skin and of the nervous system is said to be very remarkable.

Barèges, mixed tissues adapted for women's dresses, called in France *Crêpe de Barèges*, first manufactured at Luz, in the Pyrenean valley of Barèges, but now principally produced at Bagnères de Bigorre. Bareges are usually a mixture of silk and worsted; an inferior kind being composed of cotton and worsted. They vary in colour, and are sometimes light in tint, with printed patterns. All are of a slight fabric for summer wear.

Ba'regine, a slimy or gelatinous deposit in the hot sulphurous springs at Barèges, Aix-la-Chapelle, and elsewhere, which is found on microscopic examination to consist of masses of rods and filaments of *Beggiatoa* (see BACTERIA) mixed with grains of reduced sulphur. The thermal waters apparently act as culture-fluids for the atmospheric germs, and it is to the vital activities of these fungi that Cohn ascribes the evolution of sulphuretted hydrogen from the spring.

Bareilly, or BARELI, the chief city of a district and a division in Rohilkhand, United Provinces of Agra and Oudh, India, is pleasantly situated in a well-wooded plateau above the Ramganga, 152 miles E. of Delhi. Cotton, grain, and sugar are the staples of commerce; furniture and upholstery the manufactures. The chief industry is sugar-refining. Bareilly was a centre of disaffection during the Mutiny, but was taken in May 1858. Pop. (1881) 109,844; (1921) 127,939.—The district has an area of 1580 sq. m., contains 1,000,000 inhabitants, and is bounded on the N. by Tarai, and on the E. by Nepal. The area of the division is 10,720 sq. m.—a fertile tract, especially noted for the production of sugar-cane. (*Roy Bareilly*, *Rae Bareli*, or *Rai Bareli* is the name of a different town, district, and division, also in the United Provinces, near Lucknow.)

Barentz (or BARENTS), WILLIAM, a Dutch navigator, who acted as pilot in connection with several expeditions which sailed from Holland in search of a North-east passage, and who died off the coast of Novaya Zemlya, 20th June 1597. The first vessel, fitted out by the city of Amsterdam, sailed from Holland, 5th June 1594, reached the north-east extremity of Novaya Zemlya, and returned. A second expedition of seven vessels, sent out in the following year, started too late in the season to be successful; the third expedition of two ships, starting in May 1596, reached Spitsbergen, when the two parted. Barentz's vessel, doubling the north-east of Novaya Zemlya, encountered ice, and unable to sail eastward, turned towards the south. Barentz and his crew were frozen up in Ice Haven on 1st September, and spent there a miserable winter. On 13th June 1597 the crew left these desolate shores in two boats, and Barentz died shortly afterwards. The survivors reached the shores of Lapland, and were rescued. Captain Carlsen found Barentz's winter quarters undisturbed in 1871, after a lapse of 274 years, and in 1875 part of his journal was recovered by another explorer. The Barents Sea between the European mainland and Novaya Zemlya, Spitsbergen, and Franz-Josef Land, still preserves the name of this brave mariner. See Van Campen's *Barents' Relics* (Lond. 1877).

Barère de Vieuzac, BERTRAND, a French revolutionist and regicide, born at Tarbes, 10th September 1755. First an advocate at Toulouse, he acted as a deputy in the National Assembly, and was sent by the department of Hautes-Pyré-

nées to the National Convention in 1792. He soon became active as a journalist, and attached himself to the 'Mountain,' supporting it with eloquence of such a flowery and poetical style as afterwards earned him the name of the 'Anacreon of the guillotine.' He was president of the Convention when the sentence was passed upon Louis XVI. He rejected the appeal to the people, and gave his vote with these words: 'The law is for death, and I am here only as the organ of the law.' Though a supporter of Robespierre, he concurred in his downfall, yet this did not save him from being impeached and sentenced to transportation. His sentence was not carried into effect, and he shared in the general amnesty of the 18th Brumaire. Elected a deputy during the Hundred Days, he was banished after the second restoration. He betook himself to Brussels, where he devoted himself to literary work till the revolution of July permitted his return. In the year 1832 he was once more elected as a deputy by the department of the Hautes-Pyrénées; his election, however, was annulled, on account of errors of form, whereupon the government called him to be a member of the administration of that department, which office he continued to hold till 1840. He died on 14th January 1841. His *Mémoires* were edited by Hipp. Carnot (1842; trans. 1897). Barère was one of the most graceful and consummate liars in history. His masterpiece in this kind is his famous account of that glorious suicidal sinking of the ship *Vengeur* in 1794, which is still dear as a heroic story to the French people, and was described in glowing words, as a real historical exploit, by Carlyle in the first edition of his *French Revolution*. See Carlyle's *Miscellanies*.

Baretti, Giuseppe Marc Antonio, an Italian writer, born at Turin in 1719, was destined for the priesthood, but devoted himself to literature. In 1751 he established himself as a teacher of Italian in London, where in 1757 he published the *Italian Library*, giving an account of the most eminent Italian authors and their works. He afterwards spent the six years 1760–66 on the Continent, where he published a readable book of travels, and in Venice, under the name 'Aristarco Scannabue,' started the *Frusta Letteraria*, the 'literary scourge,' which was suppressed after the twenty-fifth number. In 1769 he stabbed a Haymarket bully in self-defence, and was tried for murder, but was acquitted —Dr Johnson, Burke, and Garrick testifying to the excellence of his character. He died in London, 5th May 1789. His thirty-six works included a standard Italian and English Dictionary (1760). His reputation is still high in Italy. See Birkbeck Hill's edition of Boswell's *Johnson* (1887), and the Life by Lacy Collinson Morley (1909).

Barfleur, a seaport town of France, in the department of La Manche, about 15 miles E. of Cherbourg. It is now a place of little importance, but it is noteworthy in history as the port whence, in 1066, William the Conqueror set out on his invasion of England. Population, 1000. Close by, on the ill-famed *Pointe de Barfleur*, stands the highest lighthouse in France, 271 feet above the sea.

Barfrush. See Balfrush.

Bargain and Sale, in the law of England, is a mode of conveyance whereby property, real and personal, may be assigned or transferred for valuable consideration. In England the property of goods passes before delivery by such a sale, as opposed to the executory contract of sale where the passing of the property is postponed. The expression is chiefly important in connection with the conveyance of *real* estate. Such a bargain by the Statute of Frauds must be in *writing*.

No particular form of words is essential to the validity of a bargain and sale; 'bargain and sell' are the words of transfer ordinarily used. The pecuniary consideration is held to be a mere matter of form, and any trivial sum may be inserted in the conveyance. The effect of a bargain and sale not followed by a formal conveyance, was that the seller holds the legal estate for the benefit of the purchaser. The Statute of Uses transferred the legal estate to the purchaser in all such cases, and it thus became possible to convey the legal estate without making formal delivery of the land. To prevent secret conveyances in this form, the Statute of Enrolments enacted that a bargain and sale should not pass a freehold unless made by deed enrolled within six months after its date. Since the date of this statute, bargain and sale has not been used for conveying freeholds, but it is still a common form for conveying estates less than freehold, as a mortgage for a term of years, or the common lease and release.

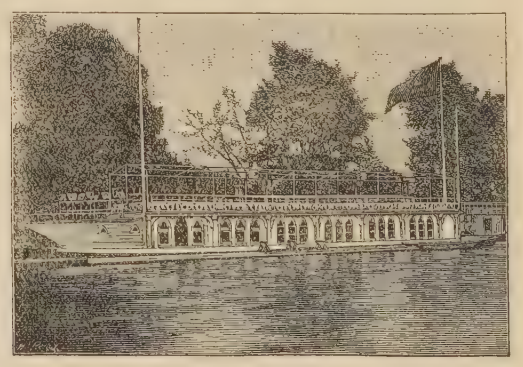
There is no such title to land or other real estate in the Scots law, but in that system there may be a contract as to land, the evidence of which must be in writing, as in holograph missives or tested minute of sale.

In the United States, bargain and sale is a contract to sell land for money or its equivalent, whereupon a use arises in favour of the bargainee to whom the seisin is transferred by force of the Statute of Uses; it is the most common form of conveyance of land in the United States. All things for the most part which may be transferred by deed, may be transferred by this mode of conveyance, and by it an estate in fee for life or for years may be created.

Barga Pass, a hill-pass in the north of Bashahr State, Punjab, leading across the Himalayas. It is the lowest of three passes within a mile's distance, and its highest part is about 15,000 feet above the sea.

Barge, an ancient town of Piedmont, in the province of Cuneo, 30 miles SW. of Turin, with slate-quarries. Pop. of commune (1921), 9004.

Barge, a name applied to vessels of various forms: (1) A pleasure-boat or boat of state, elegantly fitted, furnished with a band of rowers, used on state occasions. The college 'barges' at Oxford are similar boats, but are permanently moored. Such, too, are the 'house-boats' that have come so much into vogue on the Thames of recent years. (2) A flat-bottomed freight-boat, with or



Oxford University Barge.
(From a Photograph by Frith.)

without sails, used on our rivers and canals, either in conveying goods from one town or quay to another, or to aid in bringing stores to and from ships. Barges without sails are often called *lighters*. (3) A long narrow boat belonging to a man-of-war, for

the occasional use of the superior officers. (4) In the United States also, a double-decked passenger and freight vessel, without sails or power, and towed by a steamboat.

Barge-board, a board extending along the edge of the gable of a house to cover the rafters and

Barge-board.

keep out the rain. These barge-boards were often very richly ornamented, particularly in the 14th and 15th centuries.

Barham, Richard Harris, author of the *Ingoldsby Legends*, was born at Canterbury in 1788. In 1795 he succeeded to the manor of Tappington, and in 1802 he met with an almost fatal coach accident whilst on his way to St Paul's School, an accident that partially crippled his right arm for life. He entered Brasenose College, Oxford (1807), was ordained (1813), and in 1821 received a minor canonry of St Paul's Cathedral, three years later becoming incumbent of a City church, and priest in ordinary of the chapels royal. His first novel, *Baldwin* (1819), fell still-born; his second, *My Cousin Nicholas* (1834), appeared in *Blackwood's Magazine;* and with the commencement of *Bentley's Miscellany* in 1837, he began his series of inimitable burlesque metrical tales under the pen-name of Thomas Ingoldsby. They were first collected into a volume in 1840, and the third series was published in 1846. *The Ingoldsby Legends* at once became popular from their droll humour, fine irony, varied and whimsical rhymes, and quaint out-of-the-way learning. His lyrics were published separately in 1881. Barham was a frequent contributor to the *Edinburgh Review* and *Literary Gazette.* He died in London, June 17, 1845. See his *Life and Letters* by his son (3rd ed. 1880), and the introduction by his daughter, Mrs Bond, to the 88th edition of the *Legends* (1894).

Bar-Hebræus. See Abulfaraj.

Bari, a city of Italy, capital of an Italian province, is situated on a peninsula in the Adriatic, on the coast railway, 277 miles SE. of Ancona, and 122 NW. of Otranto. The streets of the old town only are confined and gloomy. Bari is the see of an archbishop, and has manufactures of cotton, silk, linen, and soap. Its quay and roadstead are good, and a brisk export trade is carried on. The massive old castle is of Norman origin. The old church, San Nicola, a noble specimen of the Lombard style of architecture, founded in 1087, contains some interesting monuments and relics. The still older cathedral of San Sabino has been ruined by the barbarous improvements it was subjected to in the 18th century. It contains pictures by Paul Veronese and Tintoretto. A university was opened in 1924. Pop. (1921) 114,754. Bari, the *Barium* of the Romans, was an important place to the Greeks as early as the 3d century B.C. It was made a *municipium* by Nero, was for some years under the Saracens in the 9th century, and was taken from the Greeks after a three years' siege by the Norman, Robert Guiscard, in 1071. Later it fell to the Pope, but revolted in 1228 to join the cause of the emperor, Frederick II. In 1558 it became part of the kingdom of Naples.—The province of Bari is badly watered, but wonderfully fertile, and produces fruit, wine, olive-oil, and nuts, as well as grain. Its salt and nitre works are also very important. Area, 1990 sq. m.; population, 924,384.

Bari, a race of Sudanese negroes on both sides of the White Nile, whose chief town is Gondokoro. They are tall and active, cultivate durra, and keep numerous herds of cattle; by the slave-dealers they were reputed treacherous and bloodthirsty; and they proved their manhood and warlike energy in resisting both the slave-raiders and the gradual encroachments of Egyptian officials till, in 1871, Baker Pasha conducted an expedition against them, and, after a short war, added their country to the dominions of Egypt. The language of the Bari is nearly allied to that of the Dinka and other languages of the Nile. See Africa.

Bariatinski, Alexander Ivanovich, Prince, a Russian field-marshal, born in 1814, and educated with the future tsar, Alexander II. While a young officer in the hussars, some love-passages with a grand-duchess caused his transference to the Caucasus, where his successes against the famous Shamyl (q.v.) secured him in 1852 the rank of lieutenant-general. On the accession of Alexander II., he returned to St Petersburg, and in 1856 was appointed to the command of the army of the Caucasus. Three successful campaigns were closed by the storming of Ghunib, and the capture of Shamyl. For these services he was made a field-marshal. His health, however, had broken down, and the remainder of his life was passed chiefly abroad. He died in Geneva, March 9, 1879.

Barilla, an impure carbonate of soda, procured from plants which grow in salt-marshes or other places near the sea; it forms a considerable article of commerce, being used in the manufacture of soap and of glass, and for other purposes in the arts. The greatest quantities of barilla are produced in Spain and the Balearic Islands; but the Canary Islands, Italy, and France also contribute a part. It is procured by burning the plants, much in the same way that seaweeds once were largely burned on the coasts of Scotland for kelp. The Spanish barilla is most esteemed, especially that produced near Alicante, where it is chiefly obtained from *Suaeda spicata*, a plant of the Chenopodiaceæ, systematically cultivated in grounds close by the sea. Species of *Salsola* (see Saltwort) and of *Salicornia* (see Glasswort) are also burned for barilla. The manufacture of barilla declined when it was discovered how to make soda from common salt.

Barima, a river (navigable for some 80 miles) which rises in the Imataka Mountains, flows through NW. British Guiana into Venezuela, and joins the sea east of the Orinoco delta. Its valley contains gold.

Barine, Arvède, the pen-name of Madame Cécile Vincens (1840–1908), a Parisian authoress with an idiomatic style, who translated from Tolstoy and wrote a series of brilliant essays, sketches, and biographies (Bernardin de St Pierre, De Musset, 'La Grande Mademoiselle,' &c.).

Baring, the name of a great financial and commercial house. The father of its founder was

Johann Baring, a German cloth manufacturer (son of Franz Baring, pastor at Bremen), who in 1717 started a small business at Larkbear, near Exeter. Two of his sons, Francis and John (1730–1816), established in London in 1770 the now existing house.

Sir Francis (1740–1810), born at Larkbear, was deaf from his youth; but receiving a commercial training in the house of Boehm, he overcame all obstacles, and founded a large and successful business. He became a director of the East India Company, and being a staunch supporter of Pitt, was created a baronet by that minister in 1793. He represented Grampound, Chipping Wycombe, and Calne in parliament from 1784 to 1806. He took an active part in the discussions relative to the Bank Restriction Act of 1797, and wrote on this and other financial subjects. At the time of his death he was reckoned the first merchant in Europe, and had amassed a fortune of nearly seven millions.

Sir Thomas Baring (1772–1848), eldest son of the above, succeeded his father in the baronetcy. He appears to have taken no active part in the business of the firm, being chiefly remarkable as an admirer and encourager of art. His magnificent collection of paintings was dispersed by public sale after his death in April 1848. His fourth son, Charles Thomas (1807–79), Bishop of Durham, was a strong Evangelical, noted for his piety and personal kindliness. — For Alexander Baring and his son, see Ashburton (Lord).

Sir Francis Thornhill Baring (1796–1866), son of Sir Thomas, was educated at Oxford. Under successive Whig governments, he was a Lord of the Treasury, Secretary to the Treasury, Chancellor of the Exchequer, and First Lord of the Admiralty; and he was created Baron Northbrook in 1866. His son, Thomas George, second Lord Northbrook (1826–1904), was successively a Lord of the Admiralty, Under-Secretary of State for India, Under-Secretary of War, Governor-general of India (1872–76), and First Lord of the Admiralty (1880–85), and was created an earl in 1876. See Life by Bernard Mallet (1908).

Sir Evelyn Baring, Lord Cromer (1841–1917), served in the Royal Artillery, became secretary to his cousin the Earl of Northbrook, one of the Controllers-general of Egyptian Finance (1879), Finance Minister of India (1880), and resident minister (nominally 'agent and consul-general') in Egypt in 1883–1907, and was created a baron in 1892. To his firm, generous, and enlightened policy is largely to be attributed the enormous progress of Egypt in well-being during the reign of Abbas II. (q.v.; and see Egypt). The administration of justice was greatly improved, the finances regulated, and the burdens of the inhabitants lightened; public works — especially irrigation from the great Nile reservoir at Assuan —vastly promoted agriculture; trade developed; and a new army was created. He was made an earl in 1901, retired in 1907, published *Modern Egypt* (1908), *Abbas II.* (1915), &c., and took part in British politics as a Liberal Unionist and free-trader.

Thomas Baring (1799–1873), brother of the first Lord Northbrook, sat as a Conservative from 1835. In 1885 Edward Charles Baring (1828–97), then head of the firm, was created Baron Revelstoke. In 1890 the firm just tided over a severe crisis.

Maurice Baring, writer, fourth son of the first Lord Revelstoke, was born in 1874, was in the diplomatic service 1898–1904, and for a time acted as correspondent in Russia. His works include volumes of short stories, *Orpheus in Mayfair* (1909), *Half a Minute's Silence* (1925); *Diminutive Dramas* (1910, 1919), *Grey Stocking and Other Plays* (1912); volumes of *Translations* (1919, 1925); volumes of *Collected Poems* (1911, 1925); several important books on Russia and Russian literature.

Baring-Gould, Sabine (1834–1924), was born at Exeter of an old Devonshire family. In early life he lived much in Germany and France. Educated at Clare College, Cambridge, he was appointed incumbent of Dalton, Thirsk, in 1869; rector of East Mersea, Colchester, in 1871; and in 1881, rector of Lew Trenchard, Devonshire, having also on the death of his father succeeded to the family property there in 1872. He travelled in Iceland in 1861, and published the results in *Iceland: its Scenes and Sagas* (1862). His most important books are those for which he drew upon his wide knowledge of out-of-the-way medieval lore: *The Book of Werewolves* (1865), *Post-medieval Preachers* (1865), *Curious Myths of the Middle Ages* (1866–67), *Curiosities of Olden Times* (1869). He wrote several volumes on Germany. His chief theological works are *The Origin and Development of Religious Belief* (1869–70), less lucid than learned, and *Lives of the Saints* (15 vols. 1872–77). Notable is his account of Robert S. Hawker, *The Vicar of Morwenstow* (1876). His published works (about a hundred) deal with a vast variety of subjects. Among his novels (at first anonymous), *Mehalah* (1880) is a story of uncommon power, but unequal and somewhat extravagant; others are *John Herring, Court Royal, The Gaverocks, The Pennycomequicks, Mrs Curgenven* (1893), and *The Queen of Love* (1894). *Grettir the Outlaw* (1889) is based on a saga. *In Troubadour Land* (1891), *The Tragedy of the Cæsars* (1892), *The Songs and Ballads of the West* (with others, 1890), and *Cornish Characters* (1909) are in other departments of literature. See his *Reminiscences* (1923–25).

Baringo, an African lake lying NE. of the Victoria Nyanza, and just N. of the equator. It is about 16 miles long. It has no outlet, though its water is almost fresh.

Barisal is capital of Bakarganj (q.v.) district in Bengal. Hereabouts are heard the sounds, referred to breakers, earthquakes, rock-subsidences, &c., but not satisfactorily explained, called 'Barisal guns.'

Barita, a genus of large Australian birds, better called Gymnorhina—popularly Magpies, and sometimes 'Piping Crow-shrikes.' The Common Barita (*Gymnorhina tibicen*) feeds mainly on insects, has a melodious note, and can be readily tamed and taught.

Baritone, that species of the human voice which lies between the bass and the tenor, but whose tone-character is more allied to the bass. The compass of a baritone voice is from A on the first space of the bass clef to F above the stave; but the principal notes of the voice are from C to E within that compass; and these should possess the energetic character of a bass voice, and, above all, be produced from the chest, excepting perhaps the highest. In former times the music for this species of voice was written on a stave with the F clef placed on the third line, thus: . The name is also given to a small Saxhorn (q.v.) in B♭ or C. See also Baryton.

Barium (Ba; at. number 56; at. wt. 137·4) is the metallic element present in 'heavy spar' (sulphate) and 'witherite' (carbonate). The metal is very difficult to isolate in a pure state. It has been got as a silver white substance by the electrolysis of molten barium chloride. It decomposes water readily at ordinary temperatures, and, exposed to the air, quickly combines with oxygen, forming the *oxide of barium*, BaO, or Baryta (q.v.), an earth resem-

bling quick lime. The *sulphide* is obtained when the sulphate in powder is mixed with finely pulverised coal, placed in a crucible and raised to red-heat in a furnace. The *chloride* is prepared by adding hydrochloric acid to a solution of the sulphide, when sulphuretted hydrogen escapes, and the chloride on evaporation is obtained in crystals. Barium is employed in making Oxygen (q.v.). Barium sulphate is used in X-ray diagnosis. With zinc sulphide it gives lithopone. The chlorate is used with sulphur and charcoal for preparing *green fire*. A platinum wire dipped in barium chloride solution imparts a green colour to a flame, the spectrum of barium containing green lines.

Bark. The hard outer covering of any stem is often popularly called bark, or by old botanical writers, cortex. But since in ferns this may be merely a thickening of the outer layers of the cellular envelope, into which the fibro-vascular bundles do not enter, while in monocotyledons the protective layer is not merely a hardening of the epidermis and cellular envelope, but may be firmly interwoven by the fibro-vascular bundles, and in fact indistinguishable from the inner portion of the stem, save as a region so to speak mechanically differentiated for its position, botanists are accustomed to restrict the term bark to the outer portion of the dicotyledonous stem (see DICOTYLEDONS), and especially to that of woody

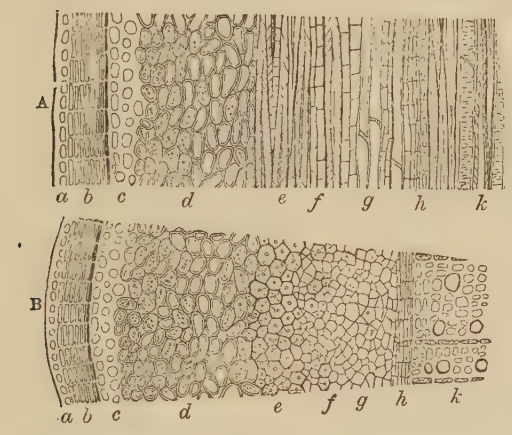


Fig. 1.—A, Longitudinal section of bark of Dicotyledon (Alder):

a, epidermis with cuticle; *b*, cork cells; *c*, thickened cells; *d*, green cellular layer of loosely placed cells containing chlorophyll; *e*, hard bast fibres; *f*, thin-walled cells of soft bast; *g*, vessels with sieve-plates of soft bast; *h*, cambium; *k*, wood with fibres and dotted vessels.

B, The same in transverse section.

and perennial stems. In succulent and herbaceous plants, and young shoots of shrubby or herbaceous ones, the stem structure resembles that of lower plants; the epidermis (which may be sooner or later for practical purposes supplemented or replaced by a subjacent layer of cork) protects the green parenchymatous layer, or *cellular envelope*, which performs leaf functions, and is, in fact, continued upwards through the leaf-stalks into the parenchyma of the leaves. Below this layer we come to the fibro-vascular bundles, which lie simply in a loose but anastomosing ring, or rather cylinder, through the meshes of which the external cellular envelope and the internal pith are in direct continuity. When, however, the dicotyledonous stem becomes perennial, its fibro-vascular bundles continue to grow through the combined multiplication of a central layer of persistently embryonic cells, the so-called *cambium;* the new cells next the inner or woody portion of the bundle develop into a second layer of wood outside the first; in the same way, the new cells next the outer or bast portion of the bundle form a new layer of bast, of course lying within the first (see BAST), and this process being repeated every spring, as many layers of wood and bast tend to be formed. The formation of bast is, however, usually less regular than that of the wood. This growth of the fibro-vascular bundles limits the outer portion of the cellular matrix, or cellular envelope, from the internal portion or pith much more sharply than before; yet the cellular continuity is still kept up, although the intermediate cells become compressed and elongated into radiating plates, the *medullary rays*. And since the cambium elements of the bundles unite to form a continuous cylindrical layer, it is evident that it is in this region of excessively delicate and thin-walled protoplasmic cells that any mechanical force applied to the stem will cause rupture. Unlike the fibro-vascular bundles of ferns, monocotyledons, or even herbaceous dicotyledons, the bast and wood of the fibro-vascular bundles of the perennial dicotyledonous stem are thus readily split asunder; the woody layers inclosing the pith are thus left exposed, while the bast layers of the bundles, with, of course, their external coverings of cellular envelope, cork, and epidermis, are thus peeled off as a hollow cylinder, while the torn cambium covers both separated surfaces with its wet and viscous remnants. Botanists were formerly wont to regard this mechanically or accidentally separated 'bark' as a distinct structure or organ highly characteristic of dicotyledons, and to distinguish its layers as parts of a natural whole, the epidermis and cork, the cellular envelope, and the bast being respectively termed outer, middle, and inner bark, or epi-, meso-, and endophloëm; but these useless and confusing terms are now happily abandoned by careful writers, since they are no more of physiological than of morphological importance. The functions of the different layers of bark are, of course, as entirely distinct as is their origin; the protective function of the epidermis, even with its cuticle, being insufficient, this is supplemented by the corky layer, which grows continuously from a layer of permanently embryonic cells, the cork cambium (see CORK). The cellular envelope continues to vegetate, more or less actively, so long as any light finds its way through the cork layer, air too finding access through loosened openings of this, the lenticels; while the functions of the bast are more complex, and are separately discussed (see BAST). The tannin and other important principles to which bark so often owes its economic importance, are usually to be regarded from the standpoint of vegetable physiology not as reserve materials, but rather as waste products of the plant's activities, which are either contained in the laticiferous vessels, or deposited in the cellular

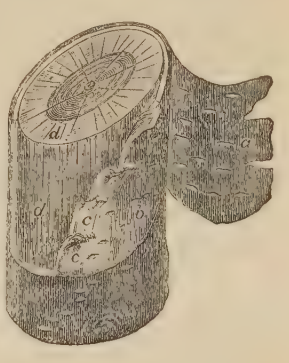


Fig. 2.—Stem of Laburnum, showing the layers of the bark:

a, layer of cork cells; *b*, green cellular layer; *cc*, bast fibres with soft bast cells and cambium on the inner surface; *d*, woody cylinder transversed by medullary rays, with cambium cells on its outer surface.

envelope and in the cells of the soft bast by the descending sap. The outer layers of thick barks usually crack as the stem expands within; but in the lace-bark tree of the West Indies (*Lagetta lintearia*) the bast fibres separate regularly, and layer after layer may thus be stripped off, showing lozenge-shaped meshes arranged with beautiful regularity.

Bark for Tanning.—The bark of many trees is capable of being used for tanning, but those kinds are usually preferred which are rich in tannin (see TANNIC ACID), although other properties besides the percentage of tannin determine the value of a bark for preparing leather. Oak bark from *Quercus Robur* and other species is used more than all other kinds in Europe, and contains from 7 to 11 per cent. of tannin; but the barks of willow, larch, Scots pine, birch and alder are likewise employed to a considerable extent. That of the Chestnut (*Castanea vesca*) is much esteemed. From both bark and wood of this tree an extract is made in France which is largely used both in tanning and dyeing. In Spain, tanners employ the inner layer of the bark of the cork oak. Tanning extracts are made from several species of oak in the United States, but there the most important source of tanning material is the Hemlock Spruce (*Tsuga canadensis*), drawn from the primitive forests of the New England States and the region of the great lakes. The vast drain on these sources of bark has told. *Acacia decurrens, A. pycnantha,* and other Australian acacias or wattles yield barks very rich in tannin; and some of them have been introduced into South Africa, where they have proved valuable. The bark of *Schinopsis Lorentzii* (Red Quebracho), from Argentina and Brazil, contains 20 per cent. of tannin. Mangrove bark (*Rhizophora Mangle*), imported from the East Indies and East Africa, although very rich in tannin, does not form a very satisfactory tanning agent.

The *barking* of trees can be accomplished with facility only in spring, when the sap has begun to circulate. The tree being felled, the rough external lifeless parts of the bark are removed as useless by means of a sharp instrument called a *scraper;* the smaller branches are cut into lengths of about two feet, and their bark is loosened by beating with a mallet, and easily taken off—as boys at the same season make plane-tree whistles; the bark of the trunk and main branches is cut through by a chisel-like instrument, called a *barking-iron,* into similar lengths, each of which is divided longitudinally, and finally stripped off by the aid of mallets, chisels, &c. The bark is sometimes dried in sheds, being placed on narrow shelves or frames in such a way that there may be a very free circulation of air about it; sometimes in the open air, when it is very generally made to rest in a sloping position against trunks of trees placed horizontally at a little distance from the ground, or against racks formed of forked sticks with cross-bars. The larger pieces of bark are placed so as to protect the smaller both from sun and rain. Great care is necessary in the drying of bark, as it is much spoiled if allowed to get mouldy, and is liable to suffer injury from rain or from the exposure of its inner surface to the sun. Bark was, and to some extent still is, a very important source of the revenue derived from many woods and coppices; but in numerous districts of Great Britain oak and other coppice-wood is no longer a profitable forest crop, owing to the low price to which bark has fallen.

Miscellaneous Uses of Bark.—In the ethnographical collections of many museums will be found some curious applications of bark. In British Guiana canoes are made of the bark of Purple Heart (*Copaifera pubiflora*) and of Locust (*Hymenæa Courbaril*). The bark of various species of Birch (*Betula*) is turned to many useful purposes throughout the northern regions of Europe and America. In Russia it is employed for roofing houses, for household basins, jars, and boxes, for shoes, and for canoes; and in North America it has a similar range of uses. Coats are made in British Columbia from pine bark, and a similar garment is formed of an elm bark by the Ainus of Japan. In both cases the bark is woven in strips. Paper is made in different parts of the world from bark, but some kinds are used quite locally (see PAPER); and a kind of soap is yielded by species of *Saponaria* and *Quillaja.* At least one aboriginal tribe in Australia forms its shields of bark. Bread of birch bark is eaten in North-west America; and in Norway and Lapland, in times of scarcity, of that of elm and pine. One of the most primitive cooking-vessels known is made of bark, and is used by the Shompengs inhabiting the interior of the Great Nicobar. The fibrous inner bark (bast) of various trees finds useful applications in many lands. The tapa cloth of the South Sea Islands is beaten out of *Broussonetia papyrifera.* The upas or sack-tree (*Antiaris toxicaria*) of the East Indies yields useful bags from its bast, a plug of the stem being left to form the bag-bottom. Lace-bark (q.v.) of Jamaica is from *Lagetta lintearia.* Gardeners' bast is obtained from the lime-tree; and Cuba bast, for tying up cigars, is yielded by the bark of *Hibiscus elatus.*

Bark in Medicine, &c.—The principal barks used in medicine will be found noticed in separate articles. Amongst them are Angostura Bark (Cusparia); Cascarilla (Cascarilla Bark, Eleutheria Bark); Cascara (Sagrada Bark, Sacred Bark, California Buckthorn Bark: see BUCKTHORN); Cinchona (Cinchona Bark, Peruvian Bark, Jesuits' Bark, China Bark, Arica Bark, Calasaya Bark, Crown Bark, Condaminea Bark, Loxa Bark, Ledger Bark, Red Bark, Quill Bark, &c.); Cinnamon Bark; Winter's Bark; Witch Hazel (Hamamelis); Bebeerine.—When bark is mentioned without any prefix, it is usually Cinchona, otherwise called Peruvian or Jesuits' Bark, that is intended.

The barks used for dyeing, tanning, and other purposes in the arts, being generally named from the trees which produce them, particular references here are unnecessary.

Bark-beetles, a name loosely applied to a number of Coleoptera which devour the bark of trees. Some of them are members of a family known to entomologists as Xylophaga, or wood-eaters. Many beetles eat wood and such substances, but the forms in question are of special

Fig. 1.—Galleries made in Pine-bark by parent (horizontal) and larvæ (vertical) of *Tomicus typographus.*

importance as forest pests. The adults are not content, like so many other beetles, with finding underneath the loose bark of trees a safe nursery for their larvæ, but bore passages, whence

the larvæ again bore outwards, so doing great damage. Thus the Typographer Beetle (*Tomicus typographus*) bores, pairs, and breeds in the bark of pine-trees, and the larvæ, laid in side recesses, eat their way out laterally, leaving their mark in the form of the curious galleries described by the title 'typographus.' In 1783 this beetle is said to have ravaged the Harz Forest in Germany to the extent of a million and a half of pines, and so revived its popular name of 'the Turk,' by which it is referred to in some old German liturgies. Another Pine-beetle (*Hylurgus piniperda*) is also a formidable devastator. The maggots develop in recesses from the main tunnel, bore their way through the bark, fly to other trees, and eat into the tender shoots. It is this last habit which is obviously most injurious. The tender bark of the young shoots of the Scotch fir, spruce, larch, &c. is the favourite food of the Pine-weevil (*Hylobius abietis*), while the maggots form winding galleries in the soft wood under the bark. The Ash-bark Beetle (*Hylesinus fraxini*) is a frequent pest in plantations where thinning and removal of sickly branches is insufficiently attended to. Another common form is the Elm-bark Beetle (*Scolytus destructor*). The female makes a burrow about 3–5 inches long, and lays a hundred or more eggs.

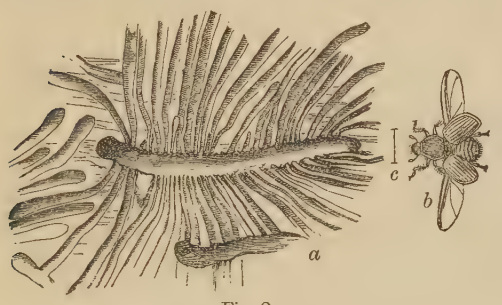


Fig. 2.

a, Galleries made by Elm-bark Beetle (*Scolytus destructor*); *b*, the insect, magnified; *c*, natural size.

The restless grubs bore outwards as usual at right angles to the parent gallery. As a curative device, the outer bark of elms is sometimes removed, with the result of causing a vigorous flow of sap, which in some way or other kills the maggots. See BEETLE, WEEVIL.

Barker, EDMUND HENRY (1788–1839), classical scholar, was born at Hollym, Yorkshire, and studied at Cambridge. He prepared editions of several Latin classics, a translation of Buttmann's *Greek Grammar*, and numerous contributions to periodicals, particularly to the *Classical Journal;* and during a five years' residence with Dr Parr, he was led to undertake a revision of Stephens's *Thesaurus Linguæ Græcæ* (12 vols. folio, 1826). This gigantic work was violently assailed in the *Quarterly Review* by Blomfield, against whom Barker wrote his *Aristarchus Anti-Blomfieldianus* (1818). Barker's *Parriana* (2 vols. 1828–29), and his posthumous *Reminiscences of Professor Porson* (2 vols. 1852), give much information about those two famous scholars, but are ill-digested and not entirely reliable. He lost all in a lawsuit, was obliged to sell his fine library, and was thrown into a debtors' prison. He died in extreme poverty.

Barker, HARLEY GRANVILLE, dramatist, actor, and manager, was born in London in 1877. By such plays as *The Voysey Inheritance* (1905), *Waste* (1907), and *The Madras House* (1910), and by his support of the Repertory movement, he has taken active part in the 20th century dramatic revival. A keen Fabian, he deals powerfully with social problems.

Barker's Mill (Fr. *Roue à réaction*, Ger. *Segner's Wasserrad*), a water-wheel invented by Dr Barker towards the middle of the 18th century.

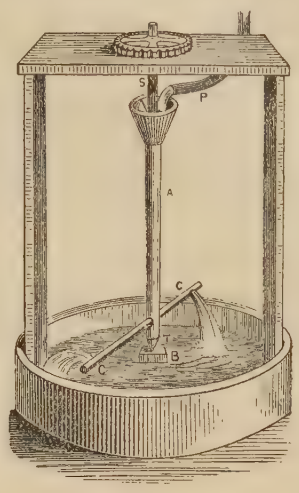


Fig. 1.

It is represented in its simplest or typical form in fig. 1. A is a wide metal pipe, resting at its lower end, by the steel spindle T, on a metal block B, and kept in a vertical position by the spindle S, at its upper end, which passes through the frame of the machine. Near its lower end, two smaller pipes or arms C, C, are inserted, which project horizontally from it, and these have each, at the outer extremity, a hole cut horizontally in them, opening towards opposite sides. The water is supplied by the pipe P. The reaction caused by the water gushing from the arms, forces them backwards, and gives to the whole machine a rotatory motion. Suppose that the arms were closed all round, the pressure of the water against the sides would be proportional to the height of the water in the pipe A, and the pressure against any particular area of the side would produce no motion of the arm, because an equal pressure is exerted in a contrary direction upon a corresponding area opposite to it. Now, if one of these surfaces be cut out, the pressure against the other, being uncounteracted, forces the arm in the opposite direction to that of the side in which the hole is made. This being done to both arms on opposite sides, two equal pressures are produced, which conspire in generating the same motion of rotation. As soon as motion ensues, centrifugal force comes into play, which, throwing the water out towards the ends of the arms, increases the rapidity of its discharge, and therefore increases the reaction.

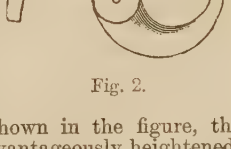


Fig. 2.

The power is manifestly increased by heightening the water-column, or by lengthening the arms—the former increasing the pressure of the water, and the latter increasing the leverage. In the mill shown in the figure, the column in A cannot be advantageously heightened, for the higher it rises, the greater must be the weight which the conical spindle, T, has to sustain, and the greater, consequently, becomes the friction. Hence, in the reaction-wheels now in use, the

original Barker's Mill has been so modified as to allow of the water being conducted from the reservoir below the arms instead of above. The power of these machines may be also increased by using curved (fig. 2) instead of straight arms. See WATER-POWER, STEAM-TURBINE.

Barking, a suburban district and market-town of Essex, on the left bank of the Roding, 7 miles NE. of London. It has a fine old church, but scarce any remains of its ancient abbey (founded 670), once one of the richest and most important Benedictine abbeys in the kingdom. Market-gardening, the manufacture of jute, and fishing give employment. Barking has a bishop-suffragan under Chelmsford. Pop. (Barking Town urban district) 35,500. For the sewage works, see SEWERAGE.

Barkly East, a town (pop. 2000; 1000 white) in the NE. of Cape Province, 82 miles SE. of Aliwal North; and **Barkly West** (pop. 2000; 500 white), on the Vaal, the oldest town in Griqualand West, once a diamond-digging centre, are both named from Sir Henry Barkly (1815–98), in 1870–77 governor of the Cape.

Barlaam and Josaphat, one of the most widely-spread religious romances of the middle ages, relating the conversion of the Indian prince Josaphat by the hermit Barlaam, his subsequent resistance of all forms of temptation, and his becoming a hermit. The story, however, has been discovered to be nothing more or less than a Christianised version of the legendary history of Buddha, agreeing with it in all essentials and many details. The very name Joasaph is merely the Buddha under another name, the word *Joasaph* or *Josaphat* being simply a corruption of the word *Bodisat*. Rhys Davids notes that Joasaph is in Arabic written also Yūdasatf; and this, through a confusion between the Arabic letters Y and B, is for Bodisatva, a title of the future Buddha which is constantly repeated in the Buddhist Birth Stories. The Buddhist origin of the romance was first pointed out by Laboulaye in 1859, but was first proved by Dr Felix Liebrecht in 1860. In fact, the story appeared probably very soon after the death of the Buddha (though the apologues or moral fables with which it is interspersed are considerably older), but it has been suggested that the Lalita-Vistara (q.v.), itself based on earlier lives, was the groundwork for the romance. It spread into other countries, and by the 8th century there existed adaptations (not direct translations) in Persian and in Arabic, and probably also in Syriac. The Greek text, which has been the basis of subsequent European translations, is a Christianised version (perhaps based on earlier Greek versions) and general adaptation, dating from the 7th or 8th century. Zotenberg, Krumbacher, Jacobs, Kuhn are in favour of the earlier date, but Boissonade (in *Anecdota*, 1832), Migne (in *Patrologia*, 1864), Max Müller, Gaston Paris, Rhys Davids, Woodward, and Mattingly, attribute the authorship to John of Damascus, who flourished in the 8th century (see JOANNES DAMASCENUS). The romance quickly became popular when translated into Latin in the late 9th century (though there is no extant Latin MS. earlier than the 12th century). It exists in Latin, French, Italian, Spanish, German, English, Swedish, and Dutch versions, and was translated as early as 1204 into Icelandic. In the official *Martyrologium* drawn up by Cardinal Baronius for use in the Western Church, and authorised by Pope Sixtus V. (1585–90), appear under the date of the 27th of November, 'the holy saints Barlaam and Josaphat of India, on the borders of Persia, whose wonderful acts St John of Damascus has described.' It is impossible to discover at what precise date their canonisation was first decreed, but they appear in the *Catalogus Sanctorum* of Petrus de Natalibus, who was Bishop of Equilium in the 14th century, and it was from this source that Cardinal Baronius adopted their names into his authorised Martyrology. The name of 'the holy Joseph, son of Abenēr, king of India,' appears in the corresponding manual of worship in use in the Greek Church under date of August 26. Max Müller remarks that 'few saints have a better claim to the title than Buddha; and no one either in the Greek or in the Roman Church need be ashamed of having paid to Buddha's memory the honour that was intended for St Josaphat, the prince, the hermit, and the saint.' See 'Die Quellen des Barlaam und Josaphat,' in Felix Liebrecht's *Zur Volkskunde* (1879); Max Müller, in vol. iii. of *Chips from a German Workshop* (1880); *Buddhist Birth Stories*, by Rhys Davids (1880); *Barlaam et Joasaph*, by Zotenberg (1866); Halévy in the *Revue de l'Histoire des Religions* (1877); *Barlaam und Josaph*, by Kuhn (1893); *Barlaam and Josaphat*, by Joseph Jacobs (1896); the translation by Woodward and Mattingly (1914); Sir Wallis Budge's introduction and translation of the Ethiopic version (1923); and for the identity of part of the text with the long lost Apology of Aristides, see the edition of the *Apology* by Rendel Harris and Robinson (1891).

Bárladu. See BERLAD.

Bar-le-Duc, capital of the French department of Meuse, situated on the river Ornain and the Marne-Rhine canal, 158 miles E. of Paris by rail. It manufactures cotton and calicoes, and carries on a trade in timber from the Vosges, and in iron, wool, and wine. The church dates from the 15th century. The Chevalier de St Georges, or Old Pretender, lived here for three years. Oudinot, Exelmans, and Raymond Poincaré were natives. The ruined castle, long the stronghold of the Dukes of Bar, still overlooks the entrance into Lorraine. Pop. 16,000.

Barletta, a seaport of Italy, on the Adriatic, 34 miles NW. of Bari by rail. It carries on a large trade with Greece and the Adriatic ports. The town has a fine cathedral, an old colossal bronze statue (supposed to be the Emperor Valentinian I.), and ancient castle. Pop. 50,000.

Barley (*Hordeum*), a cereal or grass crop. In ordinary cultivation it is annual, but some hardy varieties are sown in autumn, and except in severe winters, survive and ripen the second year, or if frequently cut green and not allowed to mature seed, may continue to grow for several years. The cultivation of it extends from Italy northwards in Europe. It is better adapted than any other grain to the most northern regions of the grain-growing belt. Some of its varieties are cultivated with advantage where the climate is too cold, or the summer too short, for any other cereal crop. It extends over a wider climatic range than any of the other grains. Barley-meal is used for bread in the north of Europe, but in other parts it is used as a horse-corn, or converted into malt for the making of beer, or deprived of its outer husky covering, and so used as an article of human food called *pot-barley*, or when well rounded and polished in the mill, *pearl-barley:* this is sometimes ground into a fine quality of barley-meal.

By botanists cultivated barley in England is divided into three species. *H. vulgare* (Scotch Bere or Bigg) is distinguished by having the grains in four rows; *H. hexastichum* in six rows; and *H. distichum* in two rows. The spikelets are in threes, of which only the middle one is fertile

in *H. distichum*. *H. vulgare* is only apparently four-rowed, and differs from *H. hexastichum* merely in having a lax instead of a dense ear. A kind with naked seeds, called *Siberian Barley* (*H. cœleste*

Barley:

a, a spike in fruit; *b*, a cluster of three spikelets in flower, with awns removed; *c*, a flower with pales; *d*, a grain (outer side).

of some writers), is cultivated in some parts of Europe, but it is liable to loss in harvest through the grain, which is slightly attached to the straw, shaking off; its straw is regarded as richer food for cattle than that of most other kinds. The *Nepaul* or *Himalaya Barley*, another variety with naked seeds, has been recommended as particularly adapted for cold mountainous regions, yielding good crops in the Himalaya at an elevation of 14,000 feet above the sea.—Of the two-rowed barley there are many varieties, of which the old Common or *Early English*, *Goldthorpe*, *Archer*, *Standwell*, and the *Chevalier* are among the most esteemed, the last being in particular demand for brewing. The *Sprat* or *Battledore Barley* (*H. zeocriton*) is also two-rowed, but is distinguished by the grains standing out from the spike, their awns spreading very widely. It is sometimes called *German Rice*, as it swells by boiling in the way that rice does, and for some purposes forms a good substitute for it. It is scarcely cultivated in Britain, but is in much esteem in Germany, and succeeds well in the Alps at an elevation of 3360 feet.

H. pratense and *H. murinum* are barley grasses seen in natural British pastures, but are of no practical value.

Barley is most productive where the climate is moderately dry and warm. No country seems to possess a soil and climate better suited to its growth than many parts of Britain. In former times, this grain was largely employed in the British Islands as human food; and is still used in some parts of Ireland, and in the Highlands of Scotland. Fine malting barley always commands a ready demand in the London market, as well as a high price.

Barley occupies a prominent place in the rotation of the lighter class of arable lands, such as in Suffolk and Norfolk. Fine malting qualities are grown on the turnip-soils of these counties, as well as throughout the south-eastern counties, where the four-course rotation is adopted. In this rotation, the barley follows the turnip-crop. The ground is worked into a fine tilling condition on the surface, and the seed is either broadcast or drilled in February or March, depending on the weather and the condition of the soil, at the rate of two, three, or four bushels to the acre. On strong land or on very rich soils, the barley-crop is sown after a grain crop, say wheat, as it is found to give a better quality, though not such a heavy crop. In the south of England, barley is allowed to stand till the grain is fully ripe, when it is cut with the scythe or reaping-machine, or most commonly with the binder. In some parts, where the straw is very short and the bulk small, it is not bound up into sheaves, but remains in the swath for a few days, when it is afterwards carted, and stored in barns or oblong stacks. The produce is more influenced by the seasons than that of wheat, as it is liable to suffer from droughts in the early part of the year, and when sown late in very dry seasons, it sometimes remains for weeks and months without germinating, and never comes to a crop. This is all the more striking when it is remembered that if sown under favourable conditions, barley germinates more quickly than any other grain crop. The average British crop is 33½ bushels per acre, but on well-farmed land from 50 to 60 bushels are got per acre. In the peaty soils of the fens of Lincolnshire, barley is not raised, as it is too liable to lodge with the rain; neither is it a favourite crop in the moist climate of the west of England.

Barley has long been grown in Scotland. The level parts of the Lothians and other counties in the east of Scotland, with Moray, Inverness, and Ross in the north, are the districts in which the finest crops are raised. In these districts barley is commonly sown after a portion only of the turnip-break. Morayshire barley has long been famous for its fine sample, and is in great demand with English brewers. On the other hand, in the less genial climate of the western counties, and also of the upper parts of Aberdeenshire, Banffshire, and Perthshire, less barley is sown, and oats frequently succeed the green-crops. In these parts the variety known as bere, or bigg, is preferred to any other, as it is not so liable to lodge, and it withstands wet weather better, and comes earlier to maturity. Bere is the variety which is cultivated by many of the small cotters in the Highlands and islands. Instead of a rotation in which green-crops find a place, a succession of corn-crops is taken, and an occasional rest is given to the soil. The crop, when ripe, is cut by sickle, scythe, or reaping-machine; bound up at once, and put into stooks, to defend it from the weather till ready to cart, and to be built up in neat round stacks. The grain is invariably thrashed out by machinery.

On good turnip-soils the land is enriched by the droppings of the sheep, frequently fed on cake and corn along with the roots, and manure is not often directly applied to the barley-crop. When the turnip-crop is drawn from the land, unless the soil is very rich, the barley should have a dressing of some phosphatic manure, say 3 cwt. or 4 cwt. per acre of superphosphate or bone-flour and 1 cwt. ammonium sulphate, at the time of sowing, or, alternatively to the latter, 1 cwt. of nitrate of soda after the plant is well up.

Barley-break, an old English country game, originally played by three couples, resembling *Prisoner's Bars*. One couple, left in a middle den called 'hell,' had to catch the others, who could *break* or separate when about to be overtaken. They then changed partners, but when caught, had to take their turn in catching the others. The game is alluded to by Sir Philip Sidney, Suckling, and Herrick. The first half of the name may be from the grain, *barley*, because often played in a

corn-field or barley-field, or it may be *barley* or *parley* (Fr. *parlez*), a truce during a game.

Barleycorn, JOHN, a personification of the spirit of barley or malt-liquor, used in humorous verse as early as 1620 (see the *N.E.D.*). Burns's ballad is more popular than the verse deserves. Under his other name of Allan-a-Maut the same deity was 'honorit' in the Bannatyne MS. and elsewhere.

Barlow, JANE, born at Clontarf, became in 1892, by her *Bogland Studies* and *Irish Idylls*, known as a sympathetic interpreter in prose and verse of Irish scenery and Irish character. Other works are *A Creel of Irish Stories*, *Ghost Bereft*, *Irish Neighbours*, and *The Mockers* (1908). She died 17th April 1917.

Barlow, JOEL, an American poet and politician, born in 1754 at Redding in Connecticut. He studied at Dartmouth and Yale Colleges, and was intended for the profession of the law, but served as a military chaplain during the War of Independence. In 1787 he published a poem called *The Vision of Columbus*, which abounds in beautiful passages, but is overburdened with political and philosophical disquisitions, and disfigured by singularities of expression. Barlow came to England in 1788 as agent for a land company, but finding that he was merely a tool of swindlers, he threw up his post, went to Paris, where he signalised himself by zealous republicanism; published in 1792 in London a poem entitled *The Conspiracy of Kings;* and endeavoured also to work upon the public mind in England by political pamphlets. In autumn 1792 he was deputed by the London reformers, with whom he was associated, to proceed to Paris, where he received the rights of French citizenship. He was one of the commission sent by France for the organisation of Savoy. He spent some years on the continent of Europe in political, literary, and mercantile pursuits, in which he made a fortune, and served for a short time as American consul at Algiers. He returned to America in 1805, and was appointed ambassador to France in 1811. He died, 22d December 1812, near Cracow, when on his way to a conference with the Emperor Napoleon at Vilna. In his later years he was gathering materials for a history of the United States. His *Columbiad* (1807), at which he laboured for half a life-time, and the germ of which was contained in his *Vision of Columbus*, is an historical review of events from the time of Columbus to the French Revolution. Other works are his intemperate *Advice to the Privileged Orders* (1791–95), and the would-be humorous poem, *Hasty Pudding*, poor stuff spite of its popularity. See Todd's *Life and Letters of Joel Barlow* (1886).

Barm. See FERMENTATION, BREAD, BEER.

Bar'mecides, or BARMEKIDES, a Persian family descended from Barmak, a physician and priest of Balkh, in the province of Khorasan, the cradle of the greatness of the Abbaside khalifs, under whom the Barmecides rose to the highest offices in the state. Khálid bin Bermek became prime-minister of Abul Abbas Al-Saffah, the first Abbaside khalif; and his influence enduring through the reigns of Al-Mansur and Al-Mahdi, the latter intrusted him with the education of his son, the celebrated Haroun Al-Raschid. The virtuous and able Yáhyá, the son of Khálid, was made vizier by Haroun upon his accession to the khalifate in 786, and both by his military skill and civil administration contributed largely to the prosperity of the reign. Under his four sons, Al-Fazl, Ja'afar, Mohammed, and Musa, the house rose to a pitch of power and splendour still more dangerous for a subject in the East than in the West. Al-Fazl and Ja'afar especially were virtual rulers of the great empire, which stretched from Mauritania to Tatary, and were widely celebrated for a splendid magnanimity and generosity that completely eclipsed the khalif. Their downfall was sudden, terrible, and infamous, and stains the great monarch's name with a blot that will never be washed away. After a convivial evening spent in different pavilions, at dead of night the khalif sent for Ja'afar's head, and ordered Yáhyá and Al-Fazl to be flung into prison at Bagdad. According to the historian Al-Tabari, the whole Barmecide family, men, women, and children, numbering over a thousand, were slaughtered with scarce an exception. The motives for this atrocious massacre have never been adequately explained. The popular idea is that given in the *Arabian Nights*. The khalif took such delight in Ja'afar's conversation that he desired his companionship even in the harem, and therefore married him *pro formâ* to his eldest sister, the beautiful Abbásah. Ja'afar bound himself by a solemn oath to be his wife's husband in name only, but failed to keep the compact, and the consequences of his folly brought upon his head the merciless wrath of the offended khalif. Some have hinted besides at a taint of heresy, or at least tolerance of heretics, that may have angered the soul of Haroun 'the orthodox.' The only conclusion we can come to is that of Al-Mas'udi: 'As regards the ultimate cause' (of the catastrophe), 'it is unknown, and Allah is Omniscient.' Sa'id ibn Sálim, the grammarian, wrote: 'Of a truth, the Barmecides did nothing to deserve Al-Raschid's s verity, but the day (of their power and prosperity) had been long, and whatso endureth long waxeth longsome.' The khalif sincerely repented his enormous crime. From that day he never enjoyed refreshing sleep—he would have given his crown to bring Ja'afar back to life. Nor did the kingdom thrive after the extermination of this wise and enlightened family. Though the khalif had forbidden mention of their name on pain of death, he could not save his ears from hearing their praises, the constant recurrence of which must ever have added a fresh sting to his penitence. The story, 'full of the waters of the eye,' as Firdousi says, took a strong hold upon the Moslem imagination, and has been told and retold a thousand times. See sec. iii. of the 'Terminal Essay,' in vol. x. (1886) of Sir Richard F. Burton's *Thousand Nights and a Night*.

BARMECIDE'S FEAST, an imaginary banquet, from the story in the *Arabian Nights* of one of the Barmecide family who put a series of empty dishes before a starving beggar, giving them magnificent names one after another as he did so. The beggar entered into the humour of his host, making as if he were eating heartily, and at last even getting so much flustered with his imaginary wine as to give him a good box on the ear, whereupon the prince, delighted with the poor fellow's patient humour, set a real dinner before him at once.

Barmen, a busy town in the district of Düsseldorf, Rheinland, extending in the beautiful valley of the Wupper for about four miles from Elberfeld almost to Langenfeld. It consists of a group of villages and three chief parts now connected together—Upper, Middle, and Lower Barmen—which united form the town of Barmen. Nowhere in Germany is so much manufacturing industry accumulated in a single spot. Barmen is the principal seat of the ribbon-manufacture on the Continent. Its fabrics go to all parts of the world. It produces linen, woollen, cotton, silk, and half-silk ribbons, cloth of various kinds, stay-laces, and thread. It has also considerable manufactures of soap, candles, metal wares, buttons, machinery, and pianofortes. There are, besides, breweries, and numerous bleach-fields and Turkey-red dye-works. Barmen is a great mis-

sionary centre, and possesses the mission-house and seminary of foreign missions belonging to the Rhenish Missionary Society. It has grown very rapidly: pop. in 1871, 74,947; in 1890, 116,144; in 1910, 169,214; in 1919, 156,326; in 1925, 187,239.

Barmouth, a picturesque and popular watering-place in the county of Merioneth, Wales, at the mouth of the Maw, 10 miles W. of Dolgelly, and 230 miles NW. of London. Gold occurs near by. Opposite, across the river, is Cader Idris, 2914 feet high. Pop. 3500.

Barn (O.E. *bere-ern*, 'barley-place'). See FARM.

Bar'nabas, ST (properly JOSES), mentioned in the Acts of the Apostles as a fellow-labourer of Paul, and even honoured with the title of apostle. He is also supposed to have founded the first Christian community at Antioch. According to tradition, he became the first Bishop of Milan, but Ambrose makes no mention of him among the bishops who had preceded him in that see. He is variously reported to have died a natural death, or to have suffered martyrdom in Rome, Alexandria, or Cyprus, in 61 A.D. His festival is celebrated in the Roman Catholic Church on June 11.

The Epistle ascribed to him bears the strongest internal evidence of being an Alexandrian forgery of the 2d century. This Epistle contains twenty-one chapters, the first four and a half in a Latin version, the rest in the original Greek. Its aim is obviously to strengthen the faith of believers in a purely spiritual Christianity. It commences by declaring that legal sacrifices are abolished, and then proceeds to show, though not in a very coherent or logical manner, how variously Christ was foretold in the Old Testament. In the tenth chapter, it spiritually allegorises the commands of Moses concerning clean and unclean beasts; in the fifteenth, it explains the 'true meaning' of the Sabbath; and in the sixteenth, what the Temple really prefigured. This concludes what may be termed the doctrinal portion of the Epistle; the remainder, which is of a practical character, describes the two ways of life—the way of Light and the way of Darkness, and closes with an exhortation that those who read it may so live that they may be blessed to all eternity. It was ascribed to Barnabas by Clemens Alexandrinus and Origen, and it is found in the *Codex Sinaiticus*. Harnack dates it 131 A.D. See APOSTOLIC FATHERS, APOSTLES (TEACHING OF THE TWELVE).—The apocryphal *Acts of Barnabas* describe his missionary tours and his death. The Gnostic *Gospel of Barnabas* is lost; another, written by an Italian convert to Mohammedanism, was published by the Clarendon Press in 1907.

Barnabites, a congregation of regular canons of St Paul, founded at Milan in 1530, and sanctioned by Pope Clement VII. two years later. They were so called because the church of St Barnabas in that city was granted them to preach in. Their special duties were—to attend the sick, to preach, to instruct the young, and to take the charge of souls. They soon established themselves in Italy, France, Austria, and Spain, and enjoyed the privilege of teaching theology in the schools of Milan and Pavia. Many eminent men have been sent forth by them. Besides the three usual monastic vows, they took a fourth—not to sue for church preferments. In France and Austria they were employed in the conversion of Protestants. They were expelled from France in 1880; and elsewhere the number of houses has dwindled away. Their founder, Antonio Zaccaria, was canonised in 1897.

Barnacle, a common crustacean, technically known as Lepas, and belonging to the group of stalked Cirripedia (q.v.). Like the closely allied sessile acorn-shell, a barnacle may be said to be a crustacean fixed by its head, and kicking the food into its mouth by its legs. So much are they disguised, however, in their fixed state, that they were formerly referred to the class of molluscs. Careful examination of the adult or inspection of the young

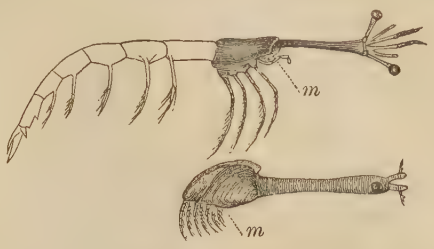


Fig. 1.—Comparison of normal Crustacean type with the degenerate condition of Cirripedes (after Darwin):
The shaded portions correspond. Note the arrested development of the abdomen, and the marked degeneration, though not decrease, of the anterior head region, which forms the barnacle stalk; *m*, mouth.

form at once demonstrates the really crustacean character of the animal. Though the barnacle is very markedly distinguished from the acorn-shell in the development of a fleshy and contractile stalk, the general structure is very much the same (see ACORN-SHELL). There is the same complex valved shell, the same six pairs of waving thoracic

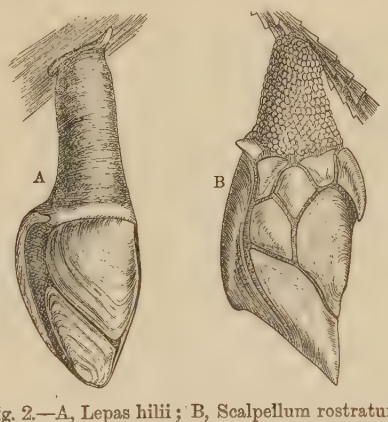


Fig. 2.—A, Lepas hilii; B, Scalpellum rostratum (after Darwin).

legs, the same cement-gland aiding by its secretion to effect attachment, the same hint of degenerate antennæ on the fixing surface, and so on. Like most of the Cirripedia, barnacles are hermaphrodite, while some nearly related forms exhibit minute, almost exclusively reproductive, 'complemental' males in close association with the normal hermaphrodites, or with females.

What has been already noted in regard to the life-history of acorn-shells, applies equally to barnacles. Little *Nauplius* larvæ escape from the egg-cases, and after moulting several times, pass into a second stage, like such water-fleas as *Daphnia* or *Cypris*. The first pair of appendages become suctorial, and after a period of free-swimming the pupa settles down on some floating object, mooring itself at first by means of its antennary suckers, but rapidly becoming glued by the secretion of the cement-ducts. After fixing, important changes in structure and position speedily occur, the valved shell is developed, and the perfect adult form gradually assumed. The food consists of small animals swept to the mouth by the curled waving legs. Growth is somewhat rapid, but the

skin-casting of the adult is, except in one genus, much restricted. Neither the valves nor the uniting membrane, nor that forming the stalk, are moulted, but the surface gradually disintegrates and is removed, perhaps sometimes in flakes,

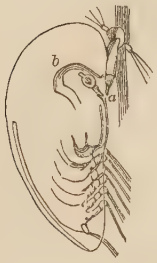


Fig. 3.—Attached Pupa of *Lepas australis* (after Darwin):
The cement-duct, *b*, is seen running to antennæ, *a*.

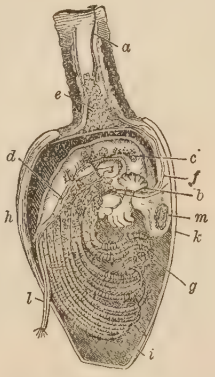
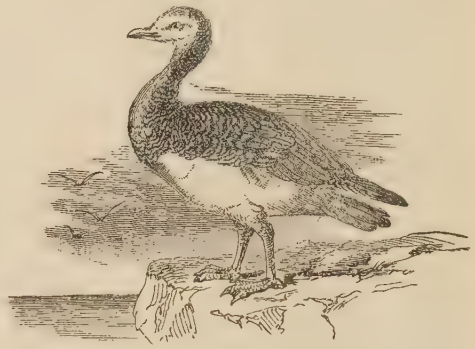


Fig. 4.—Structure of Lepas, after removing right shell and integument (after Darwin).
a, cement-gland and duct; *b*, liver; *c*, testes; *d*, vas deferens; *e*, ovary; *f*, oviduct; *g*, thoracic legs; *h*, 'carina;' *i*, tergum; *k*, 'scutum;' *l*, cirrus or penis; *m*, muscle.

whilst new and larger layers are formed beneath. The commonest species, *Lepas anatifera*, is sometimes 16 inches in length, but most of this goes to the stalk.

The stalked Cirripedia have a world-wide distribution, especially, however, in the warmer seas. Nearly half of the Lepadidæ are attached to floating objects, and are therefore peculiarly cosmopolitan. Some species are able to bore (*Lithotrya*), and more than one form has been found on shark, turtle, or whale. The stalked cirripedes are much more ancient than the sessile Balanidæ, their golden age dating back to the cretaceous period. The history of knowledge in regard to the barnacle is a striking illustration of progress. While the early naturalists, such as Gerard (1597), abandoned themselves to the citation of popular myths, according to which the barnacle was the young form of a goose (see BARNACLE GOOSE), the animal became at a later date the object of serious but not exhaustive study, and was referred to the Mollusca, or regarded as intermediate between them and Crustacea; while within comparatively recent times the discovery of the life-history has made the position of these interesting forms entirely intelligible, and the monograph of Darwin has furnished an approximately complete diagnosis of all the forms known in 1857. Subsequent research has only been an amplification and corroboration of his classic work. Apart from their occurrence on ships, floating timber, &c., the stalked cirripedes have little practical interest, except that a few forms (*Pollicipes*) are, like some of the acorn-shells, big and dainty enough to be eaten. See ACORN-SHELLS, CIRRIPEDIA; Darwin's Ray Society Monographs; and Max Müller's *Science of Language* (2d series), for the myth of the barnacle goose.

Barnacle (or BERNICLE) **Goose** (*Anser bernicla* or *Bernicla leucopsis*), the bird which the natural history of former days gravely represented as deriving its origin from a crustacean—the barnacle. In the middle ages, during what has been well called the period of mythical zoology, the enigmatical structure of the barnacle (*Lepas anatifera*), known in Germany as the 'duck-mussel' (*Enten-muschel*), somehow led it to be regarded as the young stage of the barnacle goose. The bird is in size smaller than the common wild goose,



Barnacle Goose.

being a little more than 2 feet long, and about 5 lb. in weight. The bill is somewhat longer than the head, the wings long and pointed, the tail short and rounded, the black and white plumage very prettily marked. It is a common winter visitant of the western coasts of Britain and of Ireland, and retires in spring to its home in more northern regions, where it breeds, vast numbers passing northward along the coast of Norway to the Arctic Ocean. It is highly esteemed for the table.

The Brent Goose, or Brent Barnacle (*Anser* or *Bernicla brenta* of some naturalists), has frequently received the name of barnacle goose, and no little confusion has thus arisen. It is a smaller bird with much darker plumage, remarkable for length of wing and powerful flight, and for its distant migrations. It is at home in high northern latitudes, but occurs as a common winter bird-of-passage in the United States and Canada, as also in Britain and on the continent of Europe. It is excellent for the table.

Very nearly allied to these species is the Red-breasted Goose, or Red-breasted Barnacle (*Anser ruficollis*), a beautiful bird, of which the neck and upper part of the breast are of a rich chestnut red. In size, it resembles the brent goose. It is a very rare visitant of Britain and of the continent of Europe, and is abundant only in the extreme north of Asia.—Another species called Hutchins' Goose or Barnacle (*A. hutchinsii*), of dark plumage, and with a triangular patch of white on each side of the head and neck, is abundant in Hudson Bay and the extreme north of America. The limits of the genera Anser and Bernicla are rather dubious. See GOOSE.

Barnard, LADY ANNE, author of 'Auld Robin Gray,' was born in 1750, eldest daughter of James Lindsay, fifth Earl of Balcarres. In 1793 she married Andrew Barnard, a son of the Bishop of Limerick, appointed in 1796 colonial secretary to Lord Macartney at the Cape of Good Hope. There Lady Anne lived from 1797 to 1802, when she returned to London, her residence till her death on 6th May 1825. Her husband came home in 1803, returned to the Cape in 1806, and died next year. Her matchless lyric, named after the old Balcarres herd, was written as early as 1772 to sing to an ancient melody; but she first acknowledged its authorship in 1823 to Sir Walter Scott. A number of her letters from South Africa were published in 1901 as *South Africa a Century Ago*. See Lord Crawford's *Lives of the Lindsays* (1849), Dorothea Fairbridge, *Lady Anne Barnard at the Cape* (1924).

Barnard, HENRY, an American educationist, born in 1811 at Hartford in Connecticut, studied at Yale College, travelled in Europe, and became in succession school commissioner of Rhode Island, of the Normal School in Hartford, president of St John's College at Annapolis in Maryland, and, in 1867, commissioner of education at Washington. In his *American Journal of Education*, he did much to promote the best interests of his country by guiding the public mind on educational questions. His works on his chosen subject are numerous and important; among them are *Pestalozzi and Pestalozzism* (1861), and *Education* (1879). He died 5th July 1900.

Barnard Castle, a market-town in the county of Durham, on the left bank of the Tees, 15 miles W. of Darlington by rail. On a rocky height over the river are the ruins of a castle built in 1112–32 by Barnard Baliol (q.v.), ancestor of John Baliol, king of Scotland, who was born in the castle, and founded an almshouse in the town. Barnard Castle is the scene of part of Scott's *Rokeby*. Near it is an art museum, French Renaissance in style, presented to the town in 1874 by the Countess Montalbo, in which are many of the art treasures formerly in Streatlam Castle. Pop. 5000.

Barnardo, THOMAS JOHN, founder of the homes for waifs, was born in Ireland in 1845, and qualified as a doctor in the hospitals of London, Edinburgh, and Paris. In 1866 he was moved to pity homeless boys in London, and presently began to rescue children who had found their only shelter at night under archways, or in courts and alleys. These were introduced to his homes, where they received an industrial training, were saved from a possible career of crime, and enabled to achieve an honourable position in life. At his death (19th September 1905) 60,000 boys and girls had passed through the homes. Dr Barnardo had under his direction over 50 separate institutions in the United Kingdom and colonies. Under his successor, William Baker (1849–1920), 30,000 more children were admitted.

Barnaul, a town of Western Siberia, on the Obi, 290 miles SSW. of Tomsk, is the centre of mining industries, with large smelting-furnaces, and a school of mines. Pop. 74,000.

Barnave, ANTOINE-PIERRE-JOSEPH-MARIE, a notable figure in the French Revolution, born at Grenoble, October 22, 1761. He early attracted attention as an eloquent pleader in the parliament of Grenoble, and was sent as the deputy of his province to the States-general in 1789. Here his trenchant logic, keen wit, and vehement eloquence on behalf of public liberty quickly brought him to the front. He opposed the absolute veto, carried through the confiscation of church-property to the use of the nation, the emancipation of the Jews, and the abolition of the religious orders, and was mainly instrumental in the liberation of the slaves and reorganisation of the colonies. He became the idol of the people, particularly after his victory over Mirabeau, in the question of the power of peace and war, which Mirabeau wished to remain with the king, and Barnave successfully claimed for the National Assembly. After the flight to Varennes, he was deputed to conduct the royal family back to Paris, and this duty he discharged with a fine courtesy to the unhappy queen. Subsequently he advocated more moderate courses, defended the inviolability of the king's person, and resisted the assertion by the assembly of its power to remove ministers. This led to his being regarded as a renegade from the national party, and to his being assailed by the fierce vituperations of the journalists. He retired to his native place on the dissolution of the National Assembly; but after the 10th of August 1792, he was impeached for treasonable correspondence with the court, tried, and guillotined 29th November 1793. See Life by E. D. Bradby (1915).

Barnby, SIR JOSEPH, musician, was born at York, 12th August 1838, and after studying at the Royal Academy of Music, held posts as organist, conductor, &c., at St James's Hall, Albert Hall (Royal Choral), Eton, and the Guildhall School. He composed motetts, cantatas, an oratorio, anthems, part songs, hymn-tunes, &c. Knighted in 1892, he died 28th January 1896.

Barnes, ALBERT (1798–1870), biblical expositor, was born at Rome, N.Y. He had charge of a church in New Jersey, and was minister of the First Presbyterian church of Philadelphia, from 1830 to 1867, when his eyesight failed. He was a thoughtful and eloquent preacher. At one time he was tried for heresy, but he was acquitted. He afterwards attached himself to the New School branch of the Presbyterians, and was a strong opponent of slavery. His plain, simple, and direct *Notes* on various parts of the Old and New Testaments, specially adapted for Sunday schools and Bible classes, had an extraordinary circulation.

Barnes, BARNABE (*c.* 1569–1609), was the son of Richard Barnes, Bishop of Durham, and is known principally by *Parthenophil* (1593), a collection of love-poems, imaginative but sometimes affected. *Spirituall Sonnets* appeared in 1595.

Barnes, ERNEST WILLIAM, born in 1874, was educated at King Edward's School, Birmingham, and Trinity College, Cambridge, where he was afterwards tutor. He was Master of the Temple (1915–19), Canon of Westminster (1918–24), and in 1924 became Bishop of Birmingham. Distinguished as a mathematician, he set himself as a preacher to expound the readjustment of dogma to scientific discovery. His frankness about evolution in a sermon at St Paul's in 1927 brought protests from the conservative and the interposition of the Archbishop of Canterbury.

Barnes, WILLIAM, perhaps the first of English purely pastoral poets, was born in the vale of Blackmoor, of an old Dorsetshire stock that had once owned land, February 22, 1800. Spite of early difficulties, he acquired remarkable learning, and after some time in a solicitor's office, taught a school at Dorchester with success. After obtaining a Cambridge degree and receiving ordination, he took the curacy of Whitcombe in 1847, from which he passed to the rectory of Winterbourne Came in 1862. Meantime he had been making himself widely known by his fine idyllic poetry in the Dorsetshire dialect, 'the bold and broad Doric of England.' His first volume appeared in 1844; the second, the well-known *Hwomely Rhymes*, in 1859; the third in 1862; the three were collected together in 1879, and published as *Poems of Rural Life in the Dorset Dialect*. These poems reveal straightforward simplicity and sincerity of style, with rare imaginative insight into the simple joys and sorrows of country life. But his sympathetic affection for the human life that 'clothes the soil' is paralleled by his patience in observing the quiet life of nature, and his power of reproducing artistically for others the impression it makes upon the mind. The sweet air of southern England blows through every stanza he writes, and has had a charm of quite singular influence on thousands who have seen Dorsetshire but with the inward eye. His verses are none the less completely artistic that the art is all unconscious, and none the less completely beautiful that the representation of man and nature in them is within its limits completely true. His world was the secluded vale of Blackmoor; and its humble

folk, with all their quaintness and humour, he has photographed with absolute truth, though with the instinct of the artist he has chosen as subject of poetic treatment only such episodes as are in themselves beautiful. There was nothing of Crabbe in his poetical equipment, and it need not be objected to a particular poet that he had eyes only for the pathos and beauty of country life, none for its squalor and misery. 'His verse is sometimes deficient in lyrical *swing*, as is apt to be the case when descriptive poetry is written in the dancing measures, which are too entirely emotional for work so calm and contemplative as the nature poetry of the English country.' Barnes made himself well known also by his chivalrous attempt to preserve the purity of the mother-tongue. His *Outline of English Speech-craft* (1878) is an attempt to teach the English language in purely English words. His tenses are 'time-takings,' adjectives are 'mark-words of suchness,' degrees of comparison are 'pitchmarks;' and sentences like 'these pitch-marks offmark sundry things by their sundry suchnesses' make large demands upon the reader's ingenuity. He wrote several works of value on philological subjects. He died 7th October 1886. See the Life by his daughter, Mrs Baxter ('Leader Scott;' 1887).

Barnes, an urban district of Surrey, in the parliamentary borough of Richmond; pop. 34,000.

Barnet, a town in the south of Hertfordshire, mostly on a hill-top, 11 miles to the NW. of London; population, 12,000. Formerly a place of importance on the great northern coach-road, it has still large cattle-fairs. Here in 1471 was fought the famous battle of Barnet, between the Yorkists and Lancastrians, in which, after a desperate struggle, the latter were routed, and their leader, Warwick, 'the king-maker,' killed, by which event Edward IV. was firmly established on the throne. An obelisk (1740) marks the spot.

Barnett, JOHN, composer, who was born at Bedford, 15th July 1802, died 17th April 1890, was for some time musical director of the Olympic Theatre, and is known as the composer of *The Mountain Sylph* (1834), *Fair Rosamond*, *Farinelli*, and other operas, besides vaudevilles and songs.—His nephew, JOHN FRANCIS BARNETT (1837–1916), studied at the Royal Academy of Music, and at Leipzig. His works comprise *The Ancient Mariner*, a cantata (1867), *Paradise and the Peri* (1870), *The Raising of Lazarus* (1870), *The Lay of the Last Minstrel* (1871), *The Good Shepherd* (1876), *The Building of the Ship* (1880), and *The Harvest Festival* (1881).

Barneveldt, JAN VAN OLDEN, Grand Pensionary of Holland, who played a great part in the long struggle with Spain, was born at Amersfoort in Utrecht in 1547, and in 1569 commenced practice at the Hague as an advocate. He early showed great ardour in the cause of the independence of his country; and as advocate-general of the province of Holland (1585), he proved equally his insight into affairs and his address in diplomatic management. Through Barneveldt's influence Prince Maurice succeeded his murdered father as stadhouder; but Barneveldt it also was, who, becoming head of the republican party, opposed the warlike tendencies of Maurice, concluded (1609) a truce with Spain, and prevented the States-general from joining the revolt of the Bohemians. His influence excited the House of Nassau to still greater jealousy, which in the religious controversies between the Remonstrants and Gomarists degenerated into the bitterest hostility (see ARMINIUS). To obviate a civil war, Barneveldt proposed an ecclesiastical assembly, which resulted in agreeing to a general toleration in respect of the disputed points. The States at first concurred in this wise measure; but the intrigues of the Orange party brought about a change of views, by representing the Remonstrants as secret friends of Spain. Barneveldt, who sympathised with the more tolerant principles of that party, was attacked in scurrilous publications, and was insulted even in the meeting of the States by the mob, with whom Maurice was an idol. The strife between the Remonstrants and Gomarists became hotter every day, and threatened to end in civil war. In 1618 Barneveldt was illegally arrested, along with Grotius and Hoogerbeets, and thrown into prison. In the following November Maurice procured the summoning of the Synod of Dort, which condemned the Remonstrants with the utmost rigour and injustice. In March 1619, while the Synod was still sitting, Barneveldt was brought to trial before a special commission of twenty-four judges, who condemned as a traitor the innocent man to whom his country owed its political existence. It was in vain that his friends and relations raised their voice; Maurice was not to be moved. On May 13, 1619, the venerable man of 71 years of age mounted the scaffold, and laid down his head with the same firmness that he had shown through all the events of his life. His two sons were at the same time dismissed from office. Four years after their father's death they took part in a conspiracy against the life of the prince, which, however, was discovered. The elder escaped to Antwerp, the younger was seized and beheaded. See Motley's *Life of Barneveldt* (2 vols. 1874).

Barnfield, RICHARD, born at Norbury, Shropshire, in 1574, was educated at Brasenose College, Oxford, and died, a country gentleman, at Stone, in Staffordshire, in 1627. His three little volumes of pastoral poetry, quaint, rhythmic, dainty, but over-luxuriant, cloying with too much sweetness, appeared in 1594, 1595, and 1598. The last contained the ode, 'As it fell upon a day,' and the sonnet, 'If Musique and sweet Poetrie agree,' which, printed by Jaggard in the *Passionate Pilgrim* (1599), were long attributed to Shakespeare. There are complete editions of his poems by Grosart (1876) and Arber (1882).

Barnsley, a county borough in the West Riding of Yorkshire, on the river Dearne, 10 miles S. of Wakefield, and 15 N. of Sheffield by rail. Standing high, in the midst of a rich mineral district, it has manufactures of linen, iron, steel, and glass, bleaching and dye works, &c. Besides ample railway communication, it has the advantage of a canal. The county court was built in 1861; and in the same year a pretty public park of 20 acres was given to the town. Barnsley became a municipal borough in 1869, a parliamentary (with Darton, &c.) in 1918. Pop. 54,000.

Barnstable, a port of entry, with coasting and fishing trade, in Massachusetts, U.S., situated on the south side of Barnstable Bay, 65 miles SE. of Boston. Pop. 5000.

Barn'staple, a town of Devonshire, on the right bank of the tidal Taw, 6 miles from its mouth, and 39½ NW. of Exeter by rail. The Taw is here crossed by a 13th-century bridge of 16 arches, which in 1834 was widened by iron-work on either side. Owing to the silting up of the river and harbour, much of the trade of Barnstaple has been transferred to Bideford. It has manufactures of lace and pottery. Barnstaple has existed since the reign of Athelstan, who built a castle here. The poet Gay was educated at the grammar-school, a pre-Reformation chapel. The parish church is of 14th-century date; and there are a town-hall (1855), an Albert memorial tower (1863), &c. Till 1885 Barnstaple returned two members to parliament. Pop. 14,500.

Barnum, PHINEAS TAYLOR, American showman, was born at Bethel, Connecticut, July 5, 1810. His father was tailor, farmer, and tavern-keeper in turn. At thirteen young Barnum was employed in a country store; and about five years afterwards, went largely into the lottery business. When only nineteen, he married clandestinely, and then moved to Danbury, where he edited *The Herald of Freedom*, and was imprisoned 60 days for a libel. In 1834 he removed to New York, where hearing of Joice Heth, the reputed nurse of General Washington, he bought her for 1000 dollars, and with the aid of wholesale advertising, exhibited her to considerable profit. He continued in the show business from 1836 to 1839, but reduced again to poverty, he sold Bibles, exhibited negro dancers, and wrote for newspapers, until in 1841 he bought Scudder's American Museum in New York, which he raised at once to prosperity by exhibiting a Japanese mermaid, made of a fish and monkey, a white negress, a woolly horse, and finally, a noted dwarf (Charles S. Stratton, of Bridgeport), styled General Tom Thumb, whom he exhibited in Europe in 1844. In 1847 he offered Jenny Lind 1000 dollars a night for 150 nights, and received 700,000 dollars—the concert tickets being sold at auction, in one case as high as 650 dollars for a single ticket. He built a villa at Bridgeport, in imitation of the Brighton Pavilion, and engaged in various speculations, one of which—a clock-factory—made him bankrupt. Settling with his creditors in 1857, he engaged anew in his career of audacious enterprises, and made another fortune. In 1866 he stood as a candidate for a seat in congress, but was unsuccessful. His *Autobiography* (1854, since greatly enlarged) has the merit at least of frankness. In 1865 he published *The Humbugs of the World;* in 1869, *Struggles and Triumphs;* and in 1883, *Money-getting.* In 1868 he relinquished the business of showman, resuming it, however, in 1871, when he organised a museum, menagerie, circus, &c., which required 500 men and horses to transport it through the country. For his hippodrome in New York he purchased for £33,000 from Messrs Sanger, London, in 1874, a duplicate of the whole plant for the pageant 'Congress of Monarchs.' His 'Greatest Show on Earth' required 100 railway cars for its conveyance. In 1879 he estimated the number of his patrons up to date as 90,000,000. In 1882 a day's receipts for his Great Show in Boston amounted to over £3000. The elephant 'Jumbo,' purchased in 1882 from the London Zoo. for £2000, was killed in 1885; and in 1887 Barnum's menagerie was destroyed by fire. In 1889 his show appeared at the Olympia in London. He died 7th April 1891, worth $5,000,000.

Baroche, PIERRE-JULES, a French politician, born at Paris, November 18, 1802. He was elected in 1847 to the Chamber of Deputies, and was made Procureur-général. In March 1850 he became Minister of the Interior, and a decided Bonapartist. He was appointed Minister of Foreign Affairs in 1860, and Minister of Justice and Public Worship in 1863. He died October 29, 1870.

Baro'da, the second city of Guzerat, capital of the territory of the Gáekwár (Guicowar), in the state of the same name, 248 miles N. of Bombay. It stands to the east of the Viswamitri, which is crossed by four stone bridges, one of which is of singular construction—an upper range of arches resting on a lower one. It has several palaces, Hindu and other temples, and the chief court of the state. Most of the houses are mean and overcrowded. Baroda occupies an important position between the coast and the interior, and the trade is considerable. Pop. 95,000.—The Mahratta state of Baroda, the political control of which in 1875 was transferred from Bombay to the government of India, includes the territories of the Gáekwár in various parts of Guzerat. Area, 8127 sq. m. (larger than Wales). The northern districts, which form a wide plain, are drained by the Nerbudda, Tapti, Mahi, and other rivers. The soil is fertile; ruined temples, deserted towns, and tanks half filled with mud, are a witness of former prosperity. There is a famous breed of large white cattle; grain, cotton, opium, tobacco, sugar-cane, and oil-seeds are the chief agricultural products, and grow luxuriantly. The Gáekwár, Malhar Rao, installed in 1871, was deposed by the British government for obvious misrule (1873–75) and a suspected attempt to poison the British resident; and another member of the Baroda family was, in 1881, appointed in his stead. Pop. (1921) 2,126,522—five-sixths Hindus.

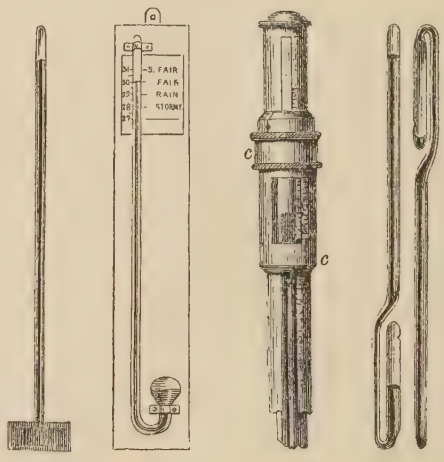
Baroja, Pío, Spanish novelist, born in 1872, a Basque with some Lombard blood, is by his own declaration an enemy of the past, 'antihistorical, antirhetorical, antitraditionalist.' His novels, dealing with affairs of the moment in Spanish life, are vividly impressionistic and somewhat formlessly picaresque. In the mediæval *Legenda de Jaun de Alzate* (1922) his mind has taken a new direction.

Baro'meter, an instrument for measuring the weight or pressure of the atmosphere, invented in 1643 by Torricelli (q.v.). The term is generally understood to refer to one in which the measure is the height of a column of liquid sustained by atmospheric pressure. The fundamental principle of the construction of the barometer is best shown in the experiment which led Torricelli to the discovery of the pressure of the air. A glass tube, about 33 inches in length, open at one end, is completely filled with mercury, and, being firmly closed by the thumb, is inverted and placed vertically in a cup containing mercury. When the thumb is removed, the mercury sinks in the tube till it stands, generally, about 30 inches above the level of the mercury in the cup, leaving in the upper part a space free of air, which receives the name of the Torricellian vacuum (fig. 1). The mercury within the tube being thus removed from the pressure of the air, while that in the cup is exposed to it, the column falls, till the pressure at the section of the whole, in the same plane as the surface of the mercury in the cup, is the same within and without the tube. A similar experiment is seen when, in a U-shaped tube, having one branch much wider than the other, a column of mercury in the narrow branch balances a column of water nearly 14 times as high in the other. In the Torricellian experiment, we have the air and the space occupied by it taking the place of the wide water branch of the U-shaped tube, and the glass tube and mercury forming the narrow branch, as before; the narrow branch, however, in this case being closed above, to prevent the air from filling, as it were, both branches. In both cases, the heights of the columns are inversely as the specific gravities of the liquids of which they consist; and as air is about 10,000 times lighter than mercury, we should have the aërial column 10,000 times 30 inches high. It will be found, under ATMOSPHERE, that from the air lessening in density as it ascends, the height is considerably greater. Any changes that take place in the density of the aërial column will be met by corresponding changes in the height of the mercurial column, so that as the latter rises or falls, the former increases or diminishes. We have, then, in this simple tube, an infallible index of the varying amount of atmospheric pressure, and, in fact, a perfect barometer. The changes, however, are indicated on a scale at least 10,000 times diminished, so that the variations in the tube show very considerable changes in the weight

of the atmosphere. If water be used instead of mercury, the water column would be 14, or, more correctly, 13·6 times as high as the mercurial column, or about 34 feet; and the scale on which the changes take place would be correspondingly magnified, so that a water barometer should be much more delicate than a mercurial one. Water is, however, exposed to this serious objection, that its vapour rises into the empty space above, and causes by its elasticity a depression of the column, the depressions being different for different temperatures. At zero, Fahrenheit, for instance, the depression thus arising would be half an inch, and at 77°, more than 1 foot. It would be doubtful, likewise, at the time of any observation, whether the space referred to was filled with vapour of the elasticity corresponding to the observed external temperature or not, so that the necessary correction could not with certainty be made. The vapour of mercury, on the other hand, at 77° F.—a temperature considerably above the average—produces in the barometer a depression of only $\frac{1}{1250}$ of an inch, an amount practically inappreciable. After 300 years of experience and invention, we have yet no better index of the pressure of the atmosphere than the simple mercurial column of Torricelli, and in all exact observations it is, in one modification or another, taken as the only reliable standard.

Simple as the barometer is, its construction demands considerable care and experience. It is of the first importance that the mercury to be used is chemically pure, otherwise its specific gravity and fluidity are impaired, and the inside of the tube becomes coated with impurities in such a way as to render correct observation impossible. Mercury as usually sold, is not pure; and before being employed for barometers, must be shaken well with highly dilute but pure nitric acid, to remove extraneous metals and oxides. The same object is effected more thoroughly by keeping it several weeks in contact with the dilute acid, stirring every now and then. After either process, the metal must be thoroughly washed with distilled water, and dried. In filling the tube, it is essentially necessary to get the column free from air and moisture. To effect this, the mercury, after filling, is boiled in the tube, so that air and moisture may be expelled, partly by the heat, and partly by the vapour of the mercury. This process demands great experience and skill, but the same end may be more easily and as effectually attained by boiling the mercury, in the first instance, in an atmosphere of carbonic acid, and then pouring it into the previously heated tube by a filler reaching to the bottom of it. Such care is only expended on the best instruments; ordinary weather-glasses, not needing to be quite accurate, are more simply filled. Notwithstanding all these precautions, minute bubbles of air may manage to keep secreted, and creep up in the course of time into the Torricellian vacuum. To obviate this risk of error, an air-trap is recommended by which any air that may accidentally find its way into the tube, or may be left in it, is arrested in its ascent to the top, and any damage to the instrument averted.

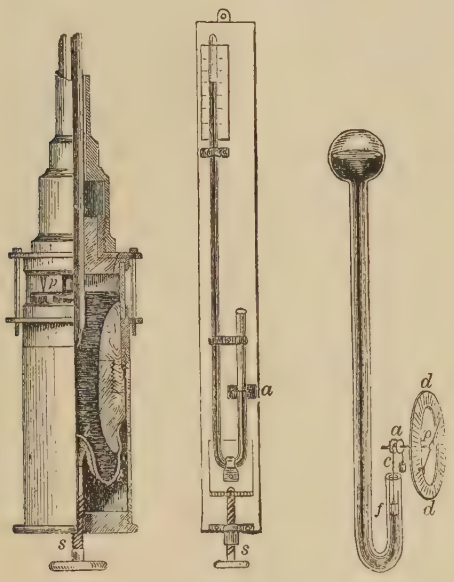
Barometers are usually divided into two classes —cistern barometers, and siphon barometers. The simplest form of the cistern barometer is that shown in fig. 1, which only requires to be set properly in a frame, and provided with a scale, to make it complete. Fig. 2 presents another form of that class, being that generally seen in weather-glasses or ordinary barometers. The tube is bent at the bottom, and the cistern is merely an expansion of the lower end. Very generally, the cistern is hidden from view, and protected from injury by a wooden cover in front. There are two causes of inaccuracy in cistern barometers—one being the capillarity, which tends to lower the



Figs. 1, 2, 3, 4, 5.

column; and the other being the difference of level in the cistern caused by the fluctuations in the tube, which renders the readings on the fixed scale at one time too great, and at another too small, according as this level rises above or falls below the original level, or zero-point, from which the scale is measured. The effect of capillarity may be avoided by using tubes of more than half an inch in bore, in which the depression becomes so small that it may be left out of account. In smaller tubes it is estimated from tables constructed for the purpose. Wide tubes have the additional advantage, that atmospheric changes are seen earlier in them than in narrow tubes, there being less friction in the wider than in the narrow. With reference to the error of level, it must be borne in mind that the height of the column sustained by the atmosphere is always to be reckoned from the surface level of the mercury in the cistern. The larger the capacity of the cistern compared with that of the tube, the less becomes this error; for then a very considerable rise or fall in the tube, when spread over the surface of the cistern, makes only a slight difference of level. Care should then be taken to make the cistern as large as possible. The barometer in which the error of level is completely obviated, is that invented by Fortin, which, from its being in every respect the most perfect cistern barometer, deserves particular notice. The cistern, and the lower portion of the tube of this barometer, are shown in fig. 6. The cistern is made of boxwood, with a movable leather bottom, *bb*, and a glass cylinder is inserted into it above, all except the glass being encased in brass. In the bottom of the brass box a screw works, on the upper end of which the leather rests, so that by the sending in or taking out the screw, the bottom of the cistern, and with it the cistern level of the mercury, can be raised or depressed at will. A small ivory pin, *p*, ending in a fine point, is fixed to the upper frame of the cistern; and when an observation is made, the surface of the mercury is made to coincide with the point of the pin as the standard level or zero-point from which the barometric column is to be measured. The tube of the barometer—the upper part of which is shown in fig. 3—is inclosed in one of brass, which has two directly opposite slits in it for showing the height of the column, and on the sides of these the graduation is marked. A

brass collar, *cc*, slides upon the tube with a Vernier (q.v.), *vv*, marked on it for reading the height with great exactness, and in which two oblong openings are cut, a little wider than the slits in the



Figs. 6, 7, 8.

brass tube. When a reading is taken, the collar is so placed that the last streak of light is cut off by the two upper edges of the openings, or until they form a tangent to the convex mercurial curve. By this means, the observer is sure that his eye is on a level with the top of the column, and that the reading is taken exactly for this point. This is the contrivance usually adopted to prevent the error of parallax, or that caused by the eye being slightly above or below the top of the column, by which the scale and the top of the column are projected too high or too low, the one upon the other, as the case may be. The only other arrangement worthy of mention for effecting the same object is that by Weber, who etches the scale on a piece of silverised glass placed over one side of the tube; and when—the mirror and tube being vertical—the image of the eye appears along with the vertex of the column, the eye is in the same horizontal line with it. Fortin's barometer is generally arranged so as to be portable, in which case the screw, *s*, is sent in until the mercury fills very nearly the whole cistern, by which the air is kept from entering the tube during transport, the leather yielding sufficiently at the same time to allow for expansion from increase of temperature. It packs in a case, which serves as a tripod when the instrument is mounted for use. On this tripod it is suspended about the middle, swinging upon two axes at right angles to each other, so that the cistern may act the part of a plummet in keeping the tube vertical —the position essential to all correct measurements.

The siphon barometer consists of a tube bent in the form of a siphon, having the same diameter at the lower as at the upper end. Fig. 7 represents a simple form of it. The tube travels along the board on which it is placed by passing easily through fixed rings or collars of brass. A scale, divided in inches and parts of an inch, is fixed on the upper part of the board; and when an observation is taken, the tube is adjusted by the screw, *s*, working below it, so that the top of the lower mercurial column may be on a level with the fixed mark, *a*, or the point from which the fixed scale is measured. In the best forms of the siphon barometer, both tube and scale are fixed, the latter being graduated upwards and downwards from a zero-point near the middle of the tube, and the height of the column is ascertained by adding the distances from it of the upper and lower levels. The siphon barometer is in some respects preferable to the cistern barometer. In the first place, the bore at the upper and lower ends of the tube being the same, the depression arising from capillarity is alike for both, and the error from this cause disappears in taking the difference of the heights. In the second place, since the final reading is got from a reference to both upper and lower surfaces, the error in the cistern barometer produced by the different capacities of the tube and cistern is effectually avoided. Gay-Lussac's siphon barometer (fig. 4) is bent near the bottom, so as to allow of the lower branch being placed in the same straight line as the upper one. When constructed for transport, the tube at the bend is narrowed, as in the figure, to a capillary width, which effectually excludes the air; and when the tube is inverted (fig. 5)—that being the position in which it is carried—the mercury is nearly all held in the longer branch. The wheel barometer, originally invented by Hook, and generally seen as a hall or parlour ornament, has nothing to recommend it as a trustworthy instrument. Fig. 8 shows the main features of its construction. See ANEROID.

Until recently barometric readings in Great Britain and other countries not employing the metric system were expressed in inches of mercury. Since 1st May 1914, however, the barometric pressures given in the 'Daily Weather Report' of the Meteorological Office are quoted in a new term, viz. millibars. The millibar is derived from the centimetre-gramme-second system of units employed generally in physics, the absolute unit of pressure on this system being the dyne per square centimetre. As this unit is exceedingly small, a practical unit one million times as great has been suggested. This unit, the megadyne per square centimetre, is called a 'bar.' On this system the value of the standard atmosphere or mean sea-level pressure, the equivalent of which is 29·92 mercury inches, is 101·32 centibars or 1013·2 millibars. On the ordinary dial barometer the word 'change' is placed opposite the reading of 29·5 inches. On the new system the reading 1000 would be substituted for the above value. It is hoped that the new system will soon be universally employed, and meteorology thus brought into line with other branches of physics, the units of which are the same in all countries.

The correction of the barometer for temperature is essential. Mercury expands $\frac{1}{5550}$ of its bulk for every degree of Fahrenheit's thermometer; if, then, a barometer stands at a height of 30 inches when the temperature of the whole instrument is 32°, it will stand at $30\frac{1}{10}$ if its temperature be raised to 69°. This increase of the length of the column by the tenth of an inch is not due to any increased pressure, but solely to the expansion of the mercury under a higher temperature. In order, therefore, that all observations may be compared correctly with each other, the observed heights are reduced to what they would be, if the temperature of the whole instrument with its contained mercury was at 32°. The rule for reduction is very simple: Multiply the number of degrees above or below 32° F. by the observed height, divide the product by 9990, and subtract or add the quotient from or to the observed height for the reduced height. Tables for this purpose have been published by the Royal Society, from which the corrections are found at once.

The variations of the barometer are both periodical and irregular. Periodical variations are those taking place at stated and regular intervals, and irregular, such as have no regular period of recurrence. Perhaps the only truly periodical variation is the daily one, which varies from about 0·150 to 0·001 inch. In most regions of the globe there is also a well-marked annual variation, widely different for different regions. Accidental variations give a range of about 4½ inches. The lowest hitherto observed is 27·333 inches, reduced to sea-level, or 925·5 millibars, at Ochtertyre, Perthshire, on January 26, 1884 (see ATMOSPHERE); at Barnaul, in Siberia, a pressure of 31·630 inches (1071·1 millibars) was recorded on December 16, 1877, where the temperature on that day fell to −54·4°.

The uses of the barometer may be classified into physical, hypsometrical, and meteorological. It is of essential use in all physical researches where the mechanical, optical, acoustical, and chemical properties of air or other gases are dependent on the pressure of the atmosphere. Its use in hypsometry, or the art of measuring the heights of mountains, is very valuable. When a barometer is at the foot of a mountain, the pressure it sustains is greater than that which is at the top by the weight of the column of air intervening between the top and bottom. A formula of considerable complexity is given by mathematicians for finding approximately the true height of a mountain from barometrical and thermometrical observations made at its base and summit, the interpretation of which does not come within the compass of this work. The following rules give very nearly the same result: (1) Reduce the mercurial heights at both stations to 32° F. (2) Take the logarithms of the corrected heights, subtract them, and multiply the result by 10,000, to give the approximate height in fathoms of the upper above the lower station. (3) Take the mean of the temperature at both stations, take the difference between this mean and 32, multiply the difference by the approximate height, and divide the product by 435. This last result is to be added to the approximate height, if the mean temperature is above 32, and subtracted, if below, to find the true height in fathoms.

The best known use of the barometer is as a meteorological instrument or as a weather-glass. Opticians sometimes attach to certain heights of the barometer particular states of weather, and at certain points of the scale the words 'Rain,' 'Changeable,' 'Fair,' &c., are marked; but the connection thus instituted is very misleading. All who would examine carefully the connection of barometric heights with changes of the weather, must discard entirely the use of these terms, seeing that it is not the actual height of the barometer at any place, but this height as compared with that of immediately surrounding regions, which indicates the weather and the strength of wind accompanying it. Several elaborate codes of rules have been drawn up to serve as a key to the variations, but as these are more or less of a local and hypothetical character, they would be here out of place. Generally speaking, a falling barometer indicates rain; a rising barometer, fair weather. A steady barometer foretells a continuance of the weather at the time; when low, this is generally broken or bad, and when high, fair. A sudden fall usually precedes a storm, and the violence of the wind is in proportion to the barometric gradient. An unsteady barometer indicates unsettled weather; gradual changes, the approach of some permanent condition of it. The variations must also be interpreted with reference to the prevailing winds, each different wind having some peculiar rules. The connection between changes of weather and the pressure of the atmosphere is by no means well understood. One or two points may, however, be stated. Since, as has been shown by Dalton, moist air is lighter than dry air, the barometric column will read relatively low wherever a large amount of aqueous vapour has displaced a part of the drier air. The south and south-west winds, which are, in Western Europe, more than any other, the rain-bringing winds, are warm and moist winds. Now, a column of such air, to be of the same weight as one of cold dry air, must be higher; but this cannot occur in the atmosphere, for no sooner does the warm moist column, by its lightness, ascend to a height where the pressure of the surrounding air is less than its own, than it ceases to rise farther, and thence flows over as an upper current in the directions where pressure is less. It follows that pressure is relatively low over any region where for the time the air is moister and warmer than in adjoining regions. On the other hand, the northerly and easterly winds, being comparatively cold and dry, are accompanied with fair weather and a high barometer. The rain attendant on a low barometer, as well as the fine weather accompanying a high barometer, are in a considerable degree to be regarded as the necessary concomitants of our geographical position—of our having the land to the east, and the ocean, with its large evaporating surface, to the west of us. In Great Britain a high and rising barometer frequently accompanies east winds with a drenching drizzle. On the La Plata River, on the other hand, matters are often the reverse of what they are with us; for there the cold south-east wind, coming from the ocean, brings rain with a high barometer, and the land winds, heated by the plains of South America, maintain fine weather with a low barometer. That the temperature, as well as the moisture of the air, is an important cause of the changes of the barometer, is also shown by the fact that, in the tropics, where the variations of the temperature are slight compared with the temperate zones, the barometer shows almost no change; and also that the region of lowest mean barometer in Asia in summer is not the region of largest rainfall, but the region of highest temperature. See the standard works on Meteorology, such as the books by Archibald, Buchan, Davis, Dickson, Moore, and Waldo.

Bar'ometz, or Tartarian or Scythian Lamb, the prostrate stem of a fern (*Aspidium barometz*) which grows in the salt-plains near the Caspian Sea. It is shaggy with yellow silken down, from which the ancients are said to have woven costly garments. The hairy covering, and a rough resemblance to an animal, seem to have formed the basis of the extraordinary opinions which were current in Russia and elsewhere, as late as a century ago, in regard to this fern. It was believed to be at once plant and animal, to grow on a stalk, but yet to have head, eyes, ears, and limbs like a lamb, to eat grass, and in other marvellous ways to show forth 'the glory of the Creator to whom all things are possible' (Herberstein, 1563). The word is an erroneous form of the Russian *baranetz*, diminutive of *baran*, 'ram.' Erman (*Travels in Siberia*, vol. i. p. 111) supposes that these fables simply originated from embellished accounts of the cotton-plant. The red viscid juice is sometimes used as an astringent.

Baron, a term originally derived from late Lat. *baro*, 'a man,' acquired, like *homo*, under the feudal system, the meaning of a vassal, 'homage' (*hominium*) being the ceremony by which the vassal became the *man* of his lord. By the 13th century in England the highest class of the king's tenants-in-chief, all of whom were holders of several knight's fees, had come in a more restricted sense

to be called barons, the term sometimes including earls and spiritual lords, besides those who were barons and nothing more. Barons possessed a civil and criminal jurisdiction, and were liable, or entitled, to take part in the general council of the nation. The provisions of the Great Charter show that in the time of King John a distinction was recognised between two classes of barons; the right of the 'barones majores' being secured to a personal summons to parliament, along with the archbishops, bishops, abbots, and earls; while the other tenants-in-chief of the crown were summoned generally by the sheriff. This personal summons became the means of defining who were great barons; and in the course of time the right to it came to be regarded as hereditary, a quality thoroughly established in the reign of Edward I. The term baron came more and more to mean the holder of a seat in the House of Lords; the existence of territorial barons, who had no seat in parliament, passed out of mind; and the word baronage came to be regarded as an equivalent for the peerage generally, members of the higher orders of the peerage being all barons. Barons who were such in virtue of their summons were known as barons by writ; and their baronies were inherited by heirs male and female. When parted between two or more co-heiresses, such a barony falls into abeyance, until one, or the sole heir of one of the co-heiresses only survives. It is held that the crown can at any time terminate the abeyance in favour of one of the co-heirs. The creation of barons by patent, first introduced in the reign of Richard II., made the dignity personal, the patent limiting the succession to it. John de Beauchamp of Holt, the first baron by patent, was created Baron of Kidderminster by letters-patent, dated 10th October 1387, to himself and the heirs-male of his body. It was not till the twenty-fourth year of Henry VI. that the practice of creating barons in this way became general; but the creation of barons by writ has now been long discontinued, except in the case of the eldest son of a peer of a higher grade, who is occasionally summoned to parliament in right of his father's barony.

In Scotland, as in England, the term baron at first included all crown vassals—but it came in the course of time to be applied in a more restricted way to such of them as had had their lands erected by the king *in liberam baroniam*. The whole barons, even in the wider sense of the word, were, theoretically at least, under the obligation to attend the council of the nation. By the less considerable landholders (even such as were in this stricter sense barons) this obligation was felt a grievous burden, and doubtless it was not very rigidly enforced. A statute of James I. in March 1427–28 enacted that the 'small barons' should be excused from attending parliament, provided they sent two or more wise men from each sheriffdom to represent them. Though this act was a failure in its main object, the introduction of parliamentary representation (which was not actually established till 1587), it seems to have afforded a quasi-sanction to the habitual absence from parliament of all but the largest landowners. The hereditary title of lord of parliament, first introduced in the 15th century, was in Scotland by no means correlative with the status of baron, it being but a small proportion of the holders of charters of barony who were invested with that dignity. About the end of the 16th century, lords of parliament began occasionally to be styled 'barones majores' in contradistinction to other holders of these lands by barony, who were 'barones minores;' and when, with the more intimate intercourse between the two countries, something like the English idea of peerage sprang up in Scotland, the position of the former was accounted analogous to that of English barons; their proper designation, however, continuing to be lords, not barons, as distinctly recognised even after the Union of 1707 had put them in possession of all the privileges of peers of England, except the right to sit in parliament and on the trial of peers.

Down to the Restoration the English barons had no coronet, but wore crimson velvet caps turned up with ermine, and at an earlier date, scarlet caps turned up with white fur. Charles II. assigned to them for coronet a circlet of gold, having six large pearls set on it, of which four are seen in the cut, the cap being of crimson velvet guarded with ermine with a gold tassel. The mantle of state is scarlet, with two doublings of ermine. In 1665, when the coronets of the peers of Scotland were assimilated to those of England, a royal warrant extended the use of this coronet to Scottish lords of parliament.

Baron's Coronet.

Scottish barons (not lords) had in virtue of their charters of barony very extensive rights of jurisdiction, civil and criminal, including 'pit and gallows,' power over life and limb: the gallows-hill is still an object of interest near some baronial mansions. That jurisdiction might be exercised either by the baron himself or by his bailie. Act 20 Geo. II., chap. 43, reduced the jurisdiction of a baron in civil matters to the right of recovering from vassals and tenants the feu-duties and rents of their lands, and of compelling them to perform the services to which they were bound; he could also entertain civil questions generally when the amount did not exceed 40s. His criminal jurisdiction was at the same time restricted to the power of inflicting a fine of 20s. for assaults. This limited jurisdiction soon fell into desuetude. The same statute further provided that no future charter of barony should confer any higher jurisdiction than the power to recover rents, multures, and will services. Some Scottish peers of higher title sit in the House of Lords as barons of the United Kingdom; thus the Duke of Argyll sits as Baron Sundridge.

The judges in the Court of Exchequer (q.v.) were from a very early period called Barons of Exchequer. The name probably meant no more than *men*, chief men, of exchequer. The parliamentary representatives of the Cinque Ports (q.v.), who sat in the House of Commons till 1831, were also called barons.

In Germany, the term baron originally meant, as it did elsewhere, a tenant-in-chief of the crown; but its signification, instead of becoming restricted, as in England, became extended. The greater barons, or dynasty-barons, who had seats in the estates of the realm, were all in the earlier part of the 18th century elevated to higher titles. Every descendant of the Knights of the Holy Roman Empire, who ranked among the lower nobility, took the style of baron; and a large number became barons in virtue of a diploma from some reigning prince, the title being used by all the descendants of the patentee.

In France, very few barons belonging to the old *noblesse* remain; most of the titles of baron now enjoyed, date from the First Empire or the Restoration. A very few were creations of Louis-Philippe. French barons bear, by way of augmentation, a sinister canton in their arms.

Baron and **Femme**, or FEME, are Norman-French words, used in English law to denote Husband and Wife (q.v.). See also MARRIAGE. The words are also used in Heraldry to designate the bearing by which the arms of husband and wife

are carried per pale, or marshalled side by side on the same shield (the husband's being on the dexter side).

Baronet, a hereditary title which, etymologically signifying a little baron, seems to have originated in a misapprehension of the derivation of the word Banneret (q.v.), sometimes called in Latin *baronettus*. This dignity was instituted by James I. in 1611, avowedly for the defence of the new plantation of Ulster, but really to replenish the king's exchequer, and was bestowed by letters-patent. The recipient of it was to be a gentleman of coat-armour for at least three descents, with a clear revenue of £1000 from lands. His patent specified his precedence as before all knights, including Knights of the Bath, and such bannerets as were not made in the field in presence of the king: the style was given him of Baronet, and the prefix 'Sir' before his name, while his wife was to have a precedence corresponding to his own, with the style of 'Lady,' 'Madame,' or 'Dame.' Each baronet came under an obligation to maintain thirty soldiers in Ireland for three years, at the rate of 8d. per day for each, the wages of a year being paid into exchequer on the passing of the patent. The sum thus exacted, with the fees of honour due to the officers, exceeded £1000 on each patent. It was stipulated that the number of baronets should not exceed 200, and that on the extinction of a baronetcy, no other should be created to fill up the vacancy. The original baronets were among the most considerable landed gentlemen in England, the first being Sir Nicholas Bacon of Redgrave, Suffolk, Knight, whose patent is dated 22d May 1611, and whose descendant is still the premier baronet. All the original patents were granted to the recipient and the heirs-male of his body. King James never exceeded the 200, except by five creations in room of five baronets who were elevated to the peerage; but his successors disregarded the restriction, and the number became unlimited. The qualifications regarding birth, estate, &c. have not been rigidly adhered to in later times, though it is still required that each baronet, before his patent be issued, shall be certified by the proper authorities to be a gentleman of coat-armour. In 1612 a dispute for precedency between baronets and the younger sons of viscounts and barons was decided by the king in favour of the latter; and it was at the same time directed that baronets might bear in their shield of arms, in a canton or inescutcheon, the arms of Ulster, argent, a sinister hand erect couped at the wrist gules—the 'bloody hand' (fig. 1). In the same year, the king knighted the heirs of the existing baronets, and ordained that the eldest sons of baronets might in future claim knighthood on attaining majority, a provision also set forth in the earlier patents, which, after falling into disuse, was recognised in three instances, in 1824, 1827, and 1835, but disallowed in the case of the eldest son of Sir James Broun, a Nova Scotia baronet, in 1836.

Fig. 1.

An order of baronets similar to that of England was instituted in Ireland in 1619, the arms of Ulster being also allowed them, and the money going to the Irish exchequer. The first baronet of Ireland was Sir Dominick Sarsfield, then Chief-justice of the Common Pleas in Ireland, whose patent was dated October 14, 1619.

The institution of the degree of baronet in Scotland, contemplated by James I., was carried out by his successor, the avowed object being to aid Sir William Alexander's scheme for the colonisation of Nova Scotia. The number was not to exceed 150; the sum payable was £3000, and the patents at first included grants of specified lands in that colony. As the lands conveyed and described had no actual existence, the grants were illusory; and the practice of including such grants in the patents continued down to 1638, though Nova Scotia had long before that date passed into the hands of the French. Baronets of Scotland are often called baronets of Nova Scotia; but the name can hardly be given with propriety to those created after 1638. The first creation was that of Sir Robert Gordon of Gordonstone, second son of Alexander, eleventh Earl of Sutherland, whose patent bore date 26th May 1625. The later creations of Charles I. included gentlemen unconnected with Scotland, and in one instance a lady, Dame Maria Bolles, of Osberton, Notts. In almost all patents by Charles I. the limitation was to heirs-male whomsoever; afterwards, though there was considerable variety, the most common limitation was to heirs-male of the body. It was at first provided that baronets of Scotland should charge their coat-armour with the arms, supporters, and crest of Nova Scotia on a canton or inescutcheon. In 1629 they became entitled to wear a personal decoration or badge pendent from an orange-tawny ribbon—viz. in an escutcheon argent, a saltire azure, thereon an inescutcheon of the arms of Scotland, an imperial crown above the escutcheon, and round the whole the motto, *Fax mentis honestæ gloria* (fig. 2). The wearing of this badge, having fallen into disuse after the Civil War, was revived at a meeting of the baronets of Scotland in 1775. In representations of the arms of a baronet of Scotland, it is usual to place this badge below the shield, hanging from an orange-tawny ribbon surrounding it.

Fig. 2.

No baronets of Scotland have been created since 1707, and of Ireland since 1801. Later baronets are of Great Britain or of the United Kingdom.

Baronets take rank immediately after the younger sons of barons; and they take precedence among themselves as follows: Baronets of England; of Scotland; of Great Britain; of Ireland; of the United Kingdom. The historic rights of a number of baronetcies have been called in question (notably by Dr J. H. Round). And a royal warrant of February 1910 commanded an official list of baronets to be prepared and kept at the Home Office, and revised in consultation with one of the kings of arms. Henceforth none shall be recognised as a baronet who is not in this list. Claims may, however, be submitted to one of the law officers of the crown and referred to the Privy-council.

Baronius, Cæsar, church historian, born at Sora, in Naples, 30th August 1538, was one of the first pupils of St Philip Neri, and attached himself to his Congregation of the Oratory, of which he afterwards became superior (1593). He became famous by his *Annales Ecclesiastici a Christo nato ad annum 1198* (12 vols. 1588–93), a reply to the *Magdeburg Centuries* of the Protestant Flacius (q.v.), aiming to prove that the Church of Rome was identical in doctrine and constitution with the Christian Church of the 1st century. Honours were now showered upon his head. He became confessor to the Pope, apostolical protonotary, cardinal in 1596, librarian of the Vatican Library, and would have been elected pope on the death of Clement VIII. in 1605 but

for the opposition of the Spaniards, who were indignant at him for his treatise, *Tractatus de Monarchia Siciliæ* (in vol. xi. of his great history), in which he argued against Spain's claim to Sicily. He died June 30, 1607. The best complete edition of the *Annales* (not unaffected by polemical purpose) is that edited by Mansi (33 vols. Lucca, 1738-59), which contains Pagi's *Critica*. Odoricus Raynaldus wrote a continuation down to the year 1565 (9 vols. 1646–76). A new edition of the work, with the continuations of Raynaldus and others, is that of A. Theiner (37 vols., Bar le Duc, 1864–83), who himself wrote a continuation for the years 1572–85 (Rome, 3 vols. 1857). Amongst other works of Baronius, his publication of the *Martyrologium Romanum* deserves to be noticed (Rome, 1586, and often reprinted).

Baron of Beef, a large piece of beef, consisting of both sides of the back, or a double sirloin, and weighing, according to the size of the animal, from 50 to 100 lb. This monstrously large piece of beef, roasted, is served only on particular festive occasions at the English court, and at great public entertainments. When served according to ancient custom at civic feasts in Guildhall, London, the baron of beef is honoured with a distinguished place on a kind of elevated rostrum, where it is ceremoniously carved for the assembled guests. The derivation of the term is unknown.

Barons' War. See MONTFORT.

Barony is, or, it may rather be said, was a manorial and hereditary right arising out of land, known to the law both of England and Scotland. In England, manors were formerly called baronies. In the Scots law, a right of barony is a right in relation to lands which have been erected by a crown-charter making the grant *in liberam baroniam*. It involved a civil and criminal jurisdiction to which, in theory, all the inhabitants of the barony lands were amenable, but this was greatly reduced by the Heritable Jurisdictions Act passed after the Rebellion of 1745, and now exists only on the civil side for the purpose of recovering rents and duties, &c. The barons had also powers with reference to the trading privileges and municipal government of certain burghs, but trading privileges were abolished in 1847, and nearly all the older burghs have now adopted modern Police Acts (see BOROUGH). The barony grant placed the baron in an exceptionally favourable position for acquiring by prescriptive possession such rights as salmon-fishing, mussel scalps, submarine minerals, &c. Indeed, where the barony is stated to be bounded by the sea, the foreshore and the privilege of collecting seaware belong to the baron, apart from possession. See *The Picture of a Scottish Baron Court*, by Patrick Anderson (reprinted Edin. 1821). For the English Court Baron, see MANOR. In Ireland the barony is the largest subdivision of the county.

Baroque (Portuguese *barroco*, 'a rough, irregular pearl'), originally a mere jewellers' term, but soon extended in sense, and applied in art to ornamental designs of an extravagant or incongruous character. The style followed the Renaissance in Italy, and was much in vogue from the middle of the 16th to the end of the 18th century. Aiming at surprises and general oddness, baroque depends entirely on the fancy and caprice of the architect, and, by means of over-accentuation and distortion of all straight lines, produces an effect often bold and sometimes picturesque, but always opposed to the established rules of art. See ROCOCO; and Ricci, *Baroque Architecture and Sculpture in Italy* (1912).

Barosma. See BUCKU.

Barossa, a quite unjustifiable English spelling of Barrosa (q.v.).

Barotse, or MAROTSE, a Bechuan (Bantu) tribe, who early in the 19th century overran the country on both sides of the Upper Zambesi now known as Barotseland (proper), then occupied by Bantu tribes akin to those of the Upper Congo. By-and-by the Bechuan Barotse were driven from power by the Makololo, a Basuto people who migrated northwards under Sebituane; but the Barotse soon re-established their power, and practically exterminated the Makololo. The present inhabitants are known as Barotse, though strictly the name belongs only to an oligarchy. At King Lewanika's request the country came under British protection. The Barotse have a large measure of local autonomy, under the advice of a Rhodesian resident, and the whole of North-Western Rhodesia (182,000 sq. m.) is called Barotseland in the wider sense of the word. See RHODESIA.

Barque, or BARK, a general name frequently given to small ships, square-sterned, without head-rails; but specially applied to a three-masted vessel whose mizzen-mast is 'fore-and-aft' rigged instead of being, like the fore and main masts, square-rigged. A 'barquentine' (on the analogy of 'brigantine') differs from a barque in that its foremast alone is square-rigged. See SHIP, SAILS.

Barquisime'to, a town of Venezuela, on a fertile and healthy plain 1700 feet above sea-level, was founded in 1522, and destroyed in 1812 by earthquake; pop. 40,000.

Barra, a small island of Inverness-shire, near the southern extremity of the Outer Hebrides, 42 miles W. of Ardnamurchan Point. It is 8 miles long, and 2 to 5 broad, with deep inlets of the sea; its area is 25 sq. m. A low sandy isthmus, over which the sea nearly breaks at high-water, connects the two parts into which Barra is divided. The south or larger part contains a rocky mountain, 2000 feet high, and is divided into small valleys. Pop. 2300, Gaelic-speaking, largely Catholic, and among the most industrious of Scottish fishermen.

Barra, a pleasant suburban town about 3 miles E. of Naples, with a pop. of 10,000.

Barra, a petty Mandingo kingdom of Gambia (q.v.), near the mouth of the Gambia, with an estimated pop. of 200,000, the men being remarkable for their fine proportions. The surface, which is fertile, but rather marshy, is well cultivated. In Barra is the port of Albreda, from which considerable trade is carried on. The chief town is Barrinding, where the so-called king resides.

Barrackpur, a native town and military cantonment, Bengal, on the E. bank of the Hughli, and 15 miles up the stream from Calcutta. It is a favourite retreat for Europeans from Calcutta; and to the south is its park, containing the suburban residence, formerly of the Viceroy of India, now of the Governor of Bengal. Two sepoy mutinies have occurred here, the first in 1824, when a regiment of Bengal infantry refused to go for service in the Burmese war; the second in the famous mutiny of 1857. Pop. about 11,500.

Barracks (originally derived through the Fr. *baraque*, from the Ital. *baracca*, or the Span. *barraca*) are permanent structures for the accommodation of soldiers, sailors, or police. Great opposition was made in this country to the introduction of permanent barracks during the early part of the last century, on the ground that the liberty of the subject might possibly be endangered by thus separating the soldiery so completely from the citizens, and placing them in the hands of the ruling power. On the other hand, it was contended that the older system of

billeting the soldiers on the people is vexatious and burdensome; and that the morals of towns-people and villagers are liable to be vitiated by the constant presence of soldiers. The permanent barracks were few in number down to the year 1792, when George III. obtained the consent of parliament for the construction of several new ones, and for the founding of the office of barrackmaster-general. Various changes in the arrangements were made from time to time. The expenditure for barracks, in building, rebuilding, enlarging, and repairing, between 1793 and 1804, was £4,100,000; between 1804 and 1819, £3,220,000; and between 1819 and 1859 (including Aldershot Barracks, q.v.), upwards of £7,000,000. The cost varied from £27 to £209 per soldier accommodated, according to the inclusion or exclusion of officers' quarters, &c. The barrackmaster-general was replaced at the beginning of the 19th century by commissioners for barracks, whose functions were absorbed in 1822 by the now extinct Board of Ordnance. A committee of inquiry on barrack accommodation was appointed in 1855, and a Royal Commission in 1857; the Barrack and Hospital Improvement Committee was made a permanent body in 1862, and, more than once reconstituted, is now merged in the office of the Director of Barrack Construction, a civilian whose office is under the Master-general of the Ordnance. The Military Works Acts of 1897, 1899, 1901, 1903, voted a total sum of over £14,000,000 for barrack construction, including large camps. The 1899 vote included a sum of £1,600,000 for infantry and artillery barracks at Salisbury Plain; and in the 1903 vote was a sum of £2,300,000 for barracks in South Africa. The estimate for 'Works and Buildings' was, for 1911–12, £2,591,000, and this may be taken as a fair average of recent years; but this includes nearly a million for repayment of old loans. The cost is provided out of revenue, and not by loan, as was done on some former occasions. The duty of designing and estimating for new military barracks was until lately in the hands of the Corps of Royal Engineers, but is now entrusted to a number of civilian architects, working under the Director mentioned above.

The type of barracks is continually evolving, based on the synopsis of barracks laid down by the War Office. This lays down the accommodation required and allowed for each kind of unit, with further details of floor-space and cubic space per man, all the accessories and offices, such as guard-rooms, canteens, recreation-rooms, lavatories, laundries, drying-grounds, cook-houses, stores, sheds. A certain percentage of the rank and file are on the 'married strength,' and these, being thus recognised, are provided with separate quarters of one to three rooms. Everything has, in fact, been done to render life in barracks as healthy as possible, and a great success has been achieved in this direction, the death-rate and the percentage of admissions into hospital, even in India and other tropical parts, having diminished to less than one-half of what they were in 1880. The general site is chosen in a healthy part. Plenty of space is allowed for between buildings. The greatest care is taken to have ample water-supply of the best quality. Access must be had to drill and manœuvre grounds of suitable size. Recreation-grounds are provided, and, where possible, soldiers' gardens. Senior officers have substantial villas, field-officers two rooms, junior officers one room, and quarters for married officers are often available. The officers' mess, which is essentially a club, is where they practically live. Besides the mess-room it has anterooms, billiard-room, library, and offices. Warrant-officers have separate quarters of a superior kind. Sergeants, in addition to their sleeping-rooms, have a mess containing dining and reading rooms and kitchen. Both the officers' and sergeants' messes are maintained by monthly subscription. The hospitals are separate buildings, constructed and equipped on the very best methods. The accommodation gives from 900 cubic feet of space for each light case to 1500 cubic feet for infectious cases. School-rooms are also provided both for the men and for the children. In addition there are the guard and orderly rooms, store-rooms, workshops, and accommodation for all the multitudinous requirements of army life. The personal comfort of the soldier is catered for by the regimental institute, consisting of the canteen and the recreation establishment. The latter has recreation and reading rooms, lecture-room, library, coffee-room, billiard-room, skittle-ground, gymnasium, and everything tending to render the life of a soldier attractive. For cavalry and artillery the barracks are on a similar plan, with additional accommodation for horses, wagons, guns, stores and shops, and riding-schools. See ALDERSHOT.

Barraconda. See GAMBIA.

Barracouta, or BARRACUDA, a voracious fish of the perch family, 8–10 feet long, found in West Indian waters. The name is also given to a *Thyrsites* found in the Southern Ocean anywhere between the Cape of Good Hope and New Zealand.

Barrafranca, a town of Sicily, 10 miles SE. of Caltanisetta, with a pop. of 10,000.

Barranquilla, the principal port of the United States of Colombia, lies near the left bank of the main channel of the Magdalena, 15 miles distant from the sea. A railway runs to the coast at Puerto Colombia, some 17 miles westward, and recently the bar at the mouth of the river has been partially removed, so as to enable sea-going vessels to come up to Barranquilla, which possesses excellent wharfage accommodation. The inland traffic by river-steamers is important. The trade is mainly in the hands of Germans. Pop. about 66,000.

Barrantes, VICENTE, a Spanish writer, born at Badajoz, 29th March 1829. He early made a reputation by his dramatic pieces, political satires, stories, and ballads. In 1858 he entered the cortes, and in 1872 was elected to the Spanish Academy. Amongst his works are *Viaje a los Infiernos*, a political satire, and an historical work on the Philippine Islands. He died in 1898.

Barras, PAUL-JEAN-FRANÇOIS-NICOLAS, COMTE DE, a prominent figure in the French Revolution, was born June 30, 1755, at Fos-Emphoux in Var, of one of its oldest noble families. In his youth he served against the English in India, but soon returning home, plunged into a life of reckless dissipation at Paris. But he soon found novel impulses in the fever of revolution. A member of the Jacobin Club from the outset, he represented Var in the National Convention, voted for the execution of the king without delay, and had a share in the downfall of the Girondists. He conducted the siege of Toulon, and suppressed, not without great cruelty, the revolt in the south of France. Hated by Robespierre as not decided enough, he attached himself to his opponents, and played the chief part in the tyrant's downfall, being appointed by the terrified Convention virtual dictator for the time. In this capacity he crushed the intrigues of the Terrorists with decision and vigour, and his humanity was said to have saved the reaction from being bloodier than it was. On subsequent occasions he acted with decision both against the intrigues of the Royalists and the excesses of the Jacobins; and on 13th Vendémiaire (5th October)

1795, being again appointed commander-in-chief by the Convention, he called his young friend Bonaparte to his aid, who crushed the insurgent sections, and assured his own future with the historical 'whiff of grape-shot.' The Directory being appointed in November 1795, Barras was nominated one of the five members. On 18th Fructidor (4th September) 1797, he was again made dictator, whereupon he removed his opponents, whom he accused of royalism, from both councils. From this time he guided the state almost alone, until his covetousness and love of pleasure had rendered him so unpopular that Bonaparte, with the help of Sieyès, was able to overthrow him easily on the 18th Brumaire (November 9) 1799. Compelled to remove from the neighbourhood of Paris, he resided in Brussels, then in Marseilles, but was banished to Rome, and thence sent to Montpellier, being kept under constant surveillance of the police, who actually found him to have been engaged in conspiracies for the bringing back of the Bourbons. After the Restoration he returned to Paris, and purchased an estate near the city with part of the great fortune he had acquired in the Revolution. He died 29th January 1829. See his Memoirs, edit. by Duruy (trans. 1895).

Barratry, COMMON, or *Barretry*, is the offence of inciting and stirring up suits and quarrels among the king's subjects. It must be shown that the party accused *frequently*, or at least on more than one occasion, conducted himself in the way imputed. The term is probably the same as the French *baraterie*, which Littré derives from a root *barat* meaning 'fraud.' The punishment for this offence is fine and imprisonment; but if the offender belongs to the profession of the law, he may besides be disabled from practising his profession for the future. And, indeed, it is the existing statute law of England, that if any one who has been convicted of barratry shall practise as an attorney, solicitor, or agent in any suit, he may be kept in penal servitude for not more than seven or less than three years.

Akin to this offence is that of suing another in the name of a fictitious plaintiff. If committed in any of the superior courts, this offence is treated as a high contempt, punishable at discretion, and in inferior courts, by six months' imprisonment, and treble damages to the party injured.

Barratry, in the sense above explained, is not a technical term in the law of Scotland. But in that system there is a word *Baratry*, which is defined as the crime committed by a judge who is induced by a bribe to pronounce a judgment, or who barters justice for money.

There is also *Baratry of Mariners*, which signifies —in the law not only of England and Scotland, but also of France and other European states—the fraud or wrongful act of the master or mariners of a ship tending to the prejudice of the owners of the ship or cargo. Such conduct is one of those risks which are usually insured against in marine policies of insurance. See INSURANCE.

Barré, ISAAC, British soldier and politician, was born at Dublin in 1726. Gazetted as an ensign in 1746, he became friendly with General Wolfe, under whom he rose to the rank of lieutenant-colonel. He was wounded in the cheek at Quebec, was beside Wolfe when he fell, and figures in West's picture of 'The Death of Wolfe.' He entered parliament in 1761, and held office successively under Lord Bute, Pitt, Rockingham, and Lord Shelburne. In Pitt's second administration he exposed the corruptions of the ministry, was a strong opponent of Lord North's ministry, and opposed the taxation of America. He died in London, 20th July 1802

Barrel, primarily a large vessel for holding liquids, next a *measure* for various wares and quantities. The barrel of ale and beer contains 36 imperial gallons. The barrel of herring contains about 800 herrings. *Barrel* also signifies a certain *weight* or other quantity of goods usually sold in casks called barrels; of salt meat, 200 lb.; butter (4 firkins), 224 lb.; soap, 256 lb.; gunpowder, 100 lb.; flour, 196 lb.; and raisins, 112 lb. In America, flour and beef are sold on the large scale in barrels: a barrel of flour must contain 196 lb.; of beef, 200 lb. A barrel of rice contains 600 lb.; of gunpowder, 25 lb.; of fish, salt meat, or bacon, 200 lb.

Barrel-organ, a mechanical organ whose music is produced by a barrel or cylinder, set with pins and staples, which, when driven round by the hand, opens the valves for admitting the wind to the pipes according to the notes of the music. The number of tunes that any one instrument can play is, of course, very limited. Barrel-organs are generally portable, and mostly used by street-musicians; though they were not unknown in English country churches in the 19th century. Superior barrel-organs are driven by a motive-power, but the instrument has been largely superseded by the barrel-piano.

Barren Island, a volcanic islet 60 miles E. of the Andaman Islands, with a diameter of about 2 miles, and a cone reaching a height of 1015 feet. The volcano was active in 1803, and still emits occasionally hot water and sulphureous fumes.

Barrenness. See STERILITY.

Barrès, MAURICE (1862–1923), French novelist, literary artist, politician, apostle of nationalism, individualism, provincial patriotism, and national energy, was born at Charmes-sur-Moselle.

Barrett, ELIZABETH. See BROWNING.

Barrhead, in Renfrewshire, 8 miles SW. of Glasgow, has cotton-mills, bleaching, dyeing, print, and sanitary works; pop. 11,500.

Barricades, defence-works formed in streets and roads of beams, chains, *chevaux-de-frise*, and other obstacles, as a defence against besiegers, or as a shelter to insurgents. As early as 1358 the streets of Paris were barricaded against the Dauphin, afterwards Charles V. In 1588 a body of 4000 Swiss soldiers, meant to overawe the Council of Sixteen, were marched into Paris by Henry III., and would have been utterly destroyed by the populace, firing from behind barricades, had the court not consented to negotiation. During the three days of the revolution of 1830, the number of barricades erected across the streets amounted to several thousands. They were formed of the most heterogeneous materials—overturned vehicles, trees, scaffolding-poles, planks, building-materials, and street paving-stones—men, women, and children taking part in their erection. In February 1848, the insurrection against Louis-Philippe commenced with the erection of barricades; but the most celebrated and bloody barricade-fight was that between the populace and the Provisional Government, 23d–26th June 1848, which ended in the defeat of the people. The national losses by this fight were estimated at 30,000,000 francs; 16,000 persons were killed and wounded, and 8000 taken prisoners. Napoleon III. widened and macadamised many of the principal streets of Paris, partly with the express purpose of rendering the successful erection of barricades next to impossible; but in the second siege of Paris (1871), the Communards threw up numbers of strong barricades. There was a remarkable barricade-erection in London in 1821. The ministry desired that the body of Queen Caroline should be conveyed out of

the country to Germany, for interment, without the populace having the opportunity of making any demonstration. On the matter becoming known, a vast barricade was erected at the point where the Hampstead Road joins the New Road; and the officer in charge of the funeral changed his course. In 1848 and 1849 barricades were carried in Paris, Berlin, Vienna, and Dresden, by taking the defenders in the rear.

Barrie, SIR JAMES MATTHEW, baronet 1913, O.M. 1922, was born 9th May 1860, at Kirriemuir, in Forfarshire, and educated there and at Dumfries Academy and Edinburgh University. After some practice as a journalist in Nottingham, he settled in London, and became a regular contributor to the *St James's Gazette*, the *British Weekly* (under the pseudonym of 'Gavin Ogilvy'), the *National Observer*, the *Speaker*, &c. His first volume, *Better Dead* (1887), was largely a satire on London life; in *Auld Licht Idylls* (1888) he opened a new and rich vein, the humour and the pathos of a typical Scottish village; 'Thrums,' his native village, still furnishes the keynote to *When a Man's Single* (1888), nominally a tale of literary life in London; and still more to *A Window in Thrums* (1889). By these three works he was rapidly raised to a front place in contemporary literature. *An Edinburgh Eleven* (1888) contains sketches of Professors Masson and Blackie, Lord Rosebery, and others, and was followed by the slight and sportive *My Lady Nicotine* (1890). *The Little Minister* (1891), his first lengthy story, appeared first as a serial in *Good Words*, and showed his characteristic excellences —grim humour, pathos, power of character-sketching and nature-description, and the gift of veracious and vivacious dialogue, but was fantastic and less true to nature than his shorter tales and sketches. *Walker, London*, a farcical comedy, had a prodigious run at Toole's Theatre in 1892. In 1894 *The Professor's Love Story* was produced on the stage. *Sentimental Tommy* appeared first in *Scribner's* in 1896, and was followed by a second part in 1899. *Margaret Ogilvy* (1896) was a biography of his own mother, and was read with as much interest as the novels. *The Little Minister* was dramatised in 1897. *The Admirable Crichton* was produced in 1903. *Peter Pan* (1904), with its delicate fancy, whimsical humour, and insight into the boy's mind, is the culmination of his dramatic work. Later plays include *What Every Woman Knows* (1908), *Dear Brutus* (1917), *Mary Rose* (1920).

Barrie, a town of Ontario, on Kempenfeldt Bay, Lake Simcoe, with sawmills, flour-mills, railway shops, and tanneries; pop. 7000.

Barrier Act. See SCOTLAND (*Ecclesiastical History*).

Barrier Reef, THE GREAT, an immense coral-reef extending along the NE. coast of Australia about 1200 miles, at a distance from the shore of from 10 to upwards of 100 miles, with but seven safe passages for ships (Raines Inlet, &c.) See CORAL, AUSTRALIA, QUEENSLAND.

Barring Out, a practice once common in schools, which consisted in the scholars fastening the doors against the master. The usual time for it was immediately prior to the vacations; and it seems to have been an understood rule that if the scholars could sustain a three days' siege, they were entitled to dictate terms regarding the number of holidays, hours of recreation, &c. for the ensuing year. The masters, in most cases, appear to have acquiesced good-humouredly in the custom; but some chafed at it and exerted their ingenuity and force to storm or surprise the garrison. Addison, according to Johnson, was the leader of a barring out at Lichfield about the year 1686. One remarkable and fatal case of barring out occurred at the High School, Edinburgh, in 1595. The town council refused to grant more than three of the eight holidays which the boys demanded as their privilege. They accordingly took advantage of the master's temporary absence to lay in a store of provisions, and having done so, barricaded the doors. The magistrates, the patrons of the school, in vain sought admission, the boys saying they would treat with their master only; and after a day and night had passed, it was resolved to force an entrance. The result was that one of them, Bailie Macmoran, was shot dead on the spot by a scholar named Sinclair. The statutes of Witton School, Cheshire, founded by Sir John Deane in 1558, ordained that 'a week before Christmas and Easter, according to the old custom, the scholars bar and keep forth the school the schoolmaster, in such sort as other scholars do in great schools.' A barring out forms the theme of one of Miss Edgeworth's stories.

Barrington, GEORGE, pickpocket and convict, was born in 1755 at Maynooth, Ireland, the son of a silversmith named Henry Waldron. In 1771 he ran away from school, and coming to London, turned pickpocket, on one occasion robbing Prince Orloff of a snuff-box, set with brilliants, valued at £30,000. Twice previously convicted, he was finally sentenced in 1790 to transportation to Botany Bay, but having on the voyage out frustrated a conspiracy amongst the convicts, he was emancipated in 1792. He became superintendent of the convicts and high constable of Paramatta in New South Wales, where he died 28th December 1804. His literary achievements are mere fables. He was erroneously credited with a famous prologue to Young's tragedy, *The Revenge*, for a representation at Sydney in 1796 (see *Athenæum*, Feb. 1898, p. 216):

> From distant climes, o'er widespread seas, we come,
> Though not with much *éclat* or beat of drum;
> True patriots we, for be it understood,
> We left our country for our country's good.
> No private views disgraced our generous zeal,
> What urged our travels was our country's weal;
> And none will doubt but that our emigration
> Has proved most useful to the British nation.

Nor was he author of *A Voyage to Botany Bay* (1801), *The History of New South Wales* (1802), and *The History of New Holland* (1808).

Barrington, (1) JOHN SHUTE, 1st VISCOUNT BARRINGTON, the son of a London merchant, was born in 1678, and called to the bar in 1699. In 1704–5 he published his *Rights of Protestant Dissenters*, which gained him the confidence of the Presbyterians. His *Dissuasive from Jacobitism* (1713) recommended him to George I., and he was raised to the Irish peerage as baron and viscount in 1720. He was returned for Berwick in 1715, and again in 1722, but was expelled from the House of Commons in 1723 on account of his connection with a bubble speculation of the time. This excessive punishment was generally ascribed to the malice of Walpole. He died in 1734. His works, mostly theological, were published in 3 vols. in 1828. Of his six sons, the following deserve notice.—(2) WILLIAM WILDMAN, 2d VISCOUNT, his eldest son, born in 1717, sat for Berwick-upon-Tweed in 1740, and until 1778 constantly held office, either in the Admiralty, the War Office, the Exchequer, or the Post-office. He died in 1793.—(3) DAINES, the fourth son, born in 1727, was called to the bar, where he attained a considerable position. His numerous writings embrace law, antiquities, and natural history, but his only important work is his *Observations on the Statutes* (1766). He died in 1800.—(4) SAMUEL, a distinguished naval officer, was the fifth son. In 1787 he was made admiral, and he died in 1800.—(5) SHUTE

(1734–1826), the youngest son, was Bishop of Llandaff, of Salisbury, and (1791) of Durham.

Barringtonia, a genus of Lecythidaceæ (or Myrtaceæ) ranging from East Africa to Samoa. Some species yield oil-seeds and timber.

Barrique, an old French wine-measure. The barrique of Bordeaux was equal to 228 litres.

Barrister is the distinctive name by which the advocates or pleaders at the English and Irish bars are known; and thus its derivation is perhaps sufficiently accounted for. They are admitted to their office under the rules and regulations of the Inns of Court (q.v.), and they are entitled to exclusive audience in all the superior courts of law and equity, and generally in all courts, civil and criminal, presided over by a superior judge. In the whole of the county courts solicitors are allowed to practise without the assistance of counsel; also at petty sessions, though at the quarter sessions where four counsel attend, the justices always give them exclusive audience (see SOLICITORS).

Barristers were first styled *Apprentices*, who answered to the bachelors of the universities, as the state and degree of a serjeant did to that of a doctor. These apprentices or barristers seem to have been first appointed by an ordinance of King Edward I. in parliament, in the twentieth year of his reign (Stephen's *Commentaries*, and authorities there referred to). Of barristers, there are various ranks and degrees, and among each other they take precedence accordingly; the general name, 'counsel,' being, in the practice of the court, common to them all. But they may be divided into two groups—barristers and King's Counsel. (The ancient order of *serjeants-at-law*, formerly a well-marked third group, was distinguished by the *coif* and other peculiarities, but has now ceased to exist. See SERJEANT-AT-LAW.) Barristers simply—technically utter barristers—occupy the position of junior counsel, wearing a plain stuff-gown and a short wig; Counsel, King's Counsel—His Majesty's Counsel learned in the law, as they are more formally called—are selected from the outer or junior bar. They are the leaders of the bar, and are distinguished by a silk gown; on state occasions, and always in the House of Lords, they wear a full-bottomed wig. For further details, see KING'S COUNSEL. Besides these three orders, the crown sometimes grants letters-patent of precedence, whereby the grantee is entitled to such precedence as may be assigned to him (see PRECEDENCE).

Barristers have exclusive audience in all the superior courts, where upon terms and conditions, and according to an etiquette, which are all well understood, they take upon themselves the protection and defence of any suitor, whether plaintiff or defendant. With the *Brief* (q.v.), or other instructions, barristers receive a *fee*, or such fee is indorsed on the brief or instructions, and afterwards paid. Such, generally, is the existing practice at the English bar, differing in this respect from the practice of the bar in Scotland—and, we believe, to a great extent in Ireland also—where *pre*-payment of the fee is the rigid etiquette. The barrister's fee is not a matter of express contract or stipulation, recoverable at law like a solicitor's bill of costs, but is regarded as a mere honorary reward—*quiddam honorarium*, as it is called in law-books. There is therefore no means of enforcing its payment; but where it can be proved that the client or party gave money to the solicitor with which to fee the counsel, the latter may maintain an action against the former for the amount in some special cases.

In order to encourage due freedom of speech in the lawful defence of their clients, and at the same time to give a check to unseemly licentiousness, it has been held that a counsel is not answerable for any matter by him spoken, relative to the cause in hand, and suggested in his client's instructions, although it should reflect upon the reputation of another, and even prove absolutely groundless (though the publication of the counsel's statement by a *third party* may expose such third party to an action); but if he mentions an untruth of his own invention, or even upon instructions, if it be impertinent to the cause in hand, he is then liable to an action from the party injured; and counsel guilty of deceit or collusion are punishable by the statute Westm. I. (3 Edw. I. chap. 29) with imprisonment for a year and a day, and perpetual silence in the courts—a punishment which may be inflicted for gross misdemeanours in practice, although the course usually resorted to is for the Benchers of the Inn of Court to which the person so offending belongs, to *disbar* him (see INNS OF COURT, DISBAR).

Besides advocacy and forensic disputation, barristers in England advise on the law by giving an opinion on a case stated—'opinion of counsel;' they also draw or prepare the pleadings or statements of fact on which an action is founded; and they prepare or revise the drafts of deeds and other instruments and of private bills (see the article CONVEYANCING). As a correlative privilege of the position in which they stand in respect of their fees, barristers are not personally liable for the injurious consequences of any erroneous advice they may give; and they claim absolute control over the conduct of all litigation in which they may be engaged, even to withdrawing it from court, unless the client expressly dissent; and until lately, it was the opinion of the profession that counsel might at any time, during the progress of a cause, compromise the matter in dispute; but the exercise of such discretion has been successfully opposed, and it is now admitted that barristers have no *ex officio* privilege beyond the guidance and conduct of actual litigation in court.

It is from the body of barristers that all the judges in England, superior and inferior, are appointed; and barristers are also always chosen for the office of paid magistrate. The only exception to the exclusive appointment of barristers to judicial offices is the case of justices of the peace (see QUARTER SESSIONS).

The bar in Ireland stands on the same footing, and has the same ranks and degrees, and is subject very much to the same rules and regulations, as the English bar; and in that country, barrister also is the name by which the profession of an advocate is distinguished. In Scotland, the same office is simply called by its own name of *Advocate* (see ADVOCATES, FACULTY OF).

At the bar of the House of Lords, and before parliament generally, before the privy-council, and also, it is believed, in all trials for high treason, whether in England, Ireland, or Scotland, the three bars rank on a footing of equality, taking precedence according to the date of their call and admission to their own respective bars, with the exception of King's Counsel. In Scotland, the latter are next in precedence to the Lord Advocate (see ADVOCATE, LORD), the Solicitor-general (q.v.) of Scotland, and the Dean of the Faculty of Advocates. It was at one time disputed between the Lord Advocate of Scotland and the Attorney-general of England, which of them should lead the other at the bar of the House of Lords; and a struggle for precedence occurred in 1834 in the House of Lords, before Lord Chancellor Brougham, between Campbell (afterwards Chancellor) as Attorney-general, and Jeffrey as Lord Advocate. The

latter contended that as he was not only the first law-officer of the crown in Scotland, but also a high political officer, he was entitled to lead the former. But the House decided that the Attorney-general of England has precedency over the Lord Advocate of Scotland, in all matters in which they may appear as counsel at their lordships' bar. The relative rank of the *Irish* law-officers to English is the same. It only remains to add, that as the three bars are on a footing of equality in the House of Lords, and before the other imperial tribunals above mentioned, the English bar have no exclusive audience in these, even in English cases.

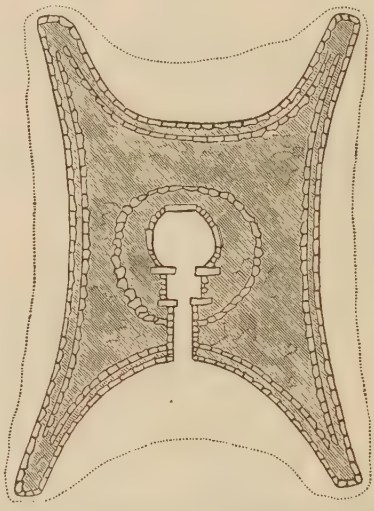
Revising Barrister was a barrister appointed annually by the English judges to revise the lists and settle who were the persons entitled to vote for members of parliament. For this purpose England was subdivided into districts, and a barrister appointed for each district by the senior judge of assize. The powers and duties of the revising barrister were defined by the Registration Act of 1878. Under the Representation of the People Acts (1918–21), the revising barrister has gone and his duties have been taken over by the county court, the clerk to the county council in the county, or the town clerk of a municipal borough. There are now two revisions yearly, the autumn revision commencing on the 15th October, and the other on the 15th April.—Similar duties are performed in Scotland by the sheriffs.

Barros, JOÃO DE, the most distinguished of Portuguese historians, was born at Vizeu in 1496, and died in 1570. He wrote an historical romance which attracted much admiration, and in 1522 he was appointed governor of the Portuguese settlements in Guinea, in 1532 treasurer of the Indies. Hereupon the king assigned him the task of writing the history of the Portuguese in India, which he undertook. But only the first four decades, down to 1526, proceeded from his pen, under the title of *Asia Portugueza;* the continuation was the work of Diego de Couto.

Barro'sa, a village of Spain, 16 miles SSE. of Cadiz, celebrated in history as the place where General Graham (afterwards Lord Lynedoch), March 5, 1811, with a handful of English troops, brilliantly defeated the French. The name is in Britain often incorrectly spelt Barossa.

Barrot, CAMILLE HYACINTHE ODILON, a prominent French statesman, born at Villefort, Lozère, 19th July 1791. At nineteen he pleaded before the ordinary tribunals, and at twenty-three, by a special dispensation, before the Court of Cassation, Paris, and early acquired a high reputation for eloquence. In the political arena also, his oratory soon made him one of the most influential leaders of the liberal opposition. He became president of the 'Aide-toi' Society in 1830, and at the July revolution in that year, was one of the three commissioners appointed to conduct the dethroned Charles X. to Cherbourg, on his way to England. On his return he was appointed prefect of the department of the Seine, and member of the Council of State, but in a few months resigned his offices to lead the opposition to Casimir Périer and the reactionary ministers who followed him. He supported Thiers from his accession to office in March 1840 to his fall in October, when he resumed his opposition to the ministry of Guizot. He took a conspicuous part in the reform movement of 1847, and spoke eloquently at several of the provincial reform banquets which led to the revolution of February 1848. Made president by Thiers in his short-lived ministry, he advised the king to withdraw his troops and thus remove the last obstacle to the downfall of his throne. In the last sitting of the Chamber of Deputies, he supported the claim of the Count de Paris to the throne, and the regency of the Duchess of Orleans. The February revolution considerably abated his ardour for public liberty. He held office for some time under the presidency of Louis Napoleon, but retired from active political life after the *coup d'état,* 2d December 1851. In July 1872 he was made a councillor of state and vice-president of the council; but he died at Bougival, near Paris, 6th August 1873. His *Mémoires Posthumes* appeared at Paris (4 vols. 1875–76).

Barrow, a sepulchral mound of earth or stones raised over the site of a burial as a mark of honour to the dead. The barrows of the Stone Age in Europe are mostly constructions of stones, oblong, oval, or circular on the ground-plan, and containing chambers for the reception of the burials. A passage opening from the exterior gives access to the chamber, which is usually situated at or near the centre of the barrow. The chambered barrows, which are peculiar to the Stone Age of Britain, are



Plan of Chambered Barrow or Cairn, at Garrywhin, Caithness.

now structureless heaps in external appearance, but were originally faced with dry-walling on the external outline of the ground-plan. The oblong variety is occasionally from 200 to 300 feet in length, and sometimes contains several chambers. Commonly, however, the chamber is situated at one end of the barrow, which in many cases faces the east, and is usually higher than the other end. The passage leading into the chamber starts from between two concave or convex projections of the end of the barrow. It is commonly low and narrow towards the exterior, increasing in height and width as it approaches the chamber. The framework, so to speak, of the chamber and passage is commonly constructed of very large stones, and hence these chambers are often referred to as *megalithic,* and the framework of such a chamber, whether covered with a mass of smaller stones and earth, or uncovered, is called a *dolmen,* and often, erroneously, a *cromlech.* The passages are usually lintelled over with great flat stones, but the roof of the chamber is constructed of beehive vaulting (see BEEHIVE HOUSES). The chamber is often divided into compartments by partitions of slabs, or has smaller chambers opening from its sides. The burials in the chambered barrows are mostly after cremation, accompanied by urns of dark-coloured, hard-baked paste, with rounded or hemispherical bottoms.

The oval and circular barrows with internal chambers are smaller, and probably later than the long barrows. They also have their external outline defined by dry-walling, and are sometimes surrounded by a trench, or by a ring-fence of standing stones. The mode of burial is the same as in the long barrows, chiefly after cremation, accompanied by urns of the same character, and by implements, weapons, and ornaments of stone and bone. Indications of funeral feasts occur in all the chambered barrows, the deposits being intermixed with bones of the domestic animals—the horse, ox, dog, sheep, swine, and occasionally the red-deer, and various species of fish and fowl. The chambered barrows of Brittany and Denmark differ from those of Britain in having their chambers flat-roofed, often with a single stone of enormous size.

The barrows of the Bronze Age in Europe are circular in form and unchambered. They are characterised by single burials, placed in cists, or simple inclosures of flat stones, like chests, the sides, ends, and cover each formed of a single slab. A barrow may contain one or many cists, but the principal burial is usually near the centre. The cists may be placed on the original surface, or at some depth beneath it. The burials in them are commonly burnt, but often unburnt, this varying with the locality. Both burnt and unburnt interments may be accompanied by urns, but occasionally no urn is present. Sometimes a barrow may contain no cists, but simply deposits of burnt bones inclosed in large cinerary urns set in the soil, or with the urns inverted over them. The urns associated with burnt burial differ in form and purpose from those usually found with unburnt burial. The cinerary urn in Britain is large and wide-mouthed, and ornamented only on the upper part. The urns set in the cists with unburnt bodies are of two varieties—one somewhat bowl-shaped, tapering to a narrow base, nearly as wide as it is high; and the other tall, thin-lipped, and bulging below. Both varieties are usually ornamented over the whole surface.

The barrows of the Iron Age in Europe are mostly earthen mounds. In Britain they are few in number. The Anglo-Saxon burial-places of the heathen time are often cemeteries of graves undistinguished by barrows or mounds upon the surface. In Scandinavia, some of the larger barrows have chambers constructed of timber, but without passages. Such was the barrow of Queen Thyra at Jellinge, in Jutland, erected in the 10th century. The three great mounds or barrows at Uppsala, in Sweden, contained burnt burials of the early Iron Age. In the later 'Viking time,' unburnt burial was the common practice. Some of the larger Viking barrows contained the ship, fully equipped as she rode the sea, and the owner laid in state in a house constructed on the deck, as in the case of the Viking ship discovered in 1880 at Gokstad Sandefjord, and now in the museum at Christiania.

The erection of barrows as marks of distinction in burial appears to have been a common custom among the early races, whether of high or of low culture and civilisation. It is repeatedly referred to in the Homeric poems. The barrows raised over the burnt bones of Hector and of Achilles and Patroclus are described as constructed of stones and earth, like those of prehistoric times, but unchambered. Herodotus describes the Scythian custom of barrow-burial as existing in his time; and in the case of the barrow raised over Hephæstion, the friend of Alexander the Great, we have the cost of its construction stated at 1200 talents, which has been computed as equivalent to something like £232,500 sterling. See Canon Greenwell's *British Barrows* (Oxford, Clar. Press, 1877), and other works cited at ARCHÆOLOGY; also BURIAL.

Barrow, a term applied to three prominent localities of the Arctic Ocean, in honour of Sir John Barrow.—(1) *Point Barrow*, on the northern coast of Alaska, in 71° 23′ N. lat. and 156° 31′ W. long., long received as the most northerly spot on the American mainland (but see BELLOT STRAIT, BOOTHIA).—(2) *Cape Barrow*, on the northern coast of Canada, or Coronation Gulf, 68° N. lat., 111° W. long.—(3) *Barrow Strait*, the earliest of Parry's discoveries, leading to the west out of Lancaster Sound, which Parry's immediate predecessor, Captain, afterwards Sir John Ross, had pronounced to be landlocked in that direction. Besides its main course to Melville Sound, Barrow Strait throws off Prince Regent's Inlet to the south, and Wellington Channel to the north. The passage averages about 50 miles in breadth, extending pretty nearly along the parallel of 74° N., from 85° to 100° W.

Barrow, a river in the south-east of Ireland. Of the Irish rivers, it is in importance next to the Shannon. It rises in the north of Queen's County, on the north-east slope of the Slieve Bloom ridge of mountains. It flows first east past Portarlington to the border of County Kildare, and then southward, passing the towns of Athy, Carlow, and New Ross. It has a course of 100 miles through a carboniferous, granitic, and silurian basin. Two miles above New Ross it receives the Nore, and 8 miles east of Waterford, it is joined by the Suir (q.v.). These three rivers (called the Three Sisters) form, near the sea, the large and secure estuary of Waterford harbour, 9 miles long. The Barrow is navigable for ships of 300 tons to New Ross, 25 miles up, and for barges to Athy, 65 miles up, whence the Grand Canal communicates with Dublin.

Barrow, ISAAC, a mathematician and divine, was born in 1630 in London, where his father was linen-draper to Charles I. At the Charterhouse he was chiefly distinguished for pugnacity; but at Felstead, in Essex, his next school, he greatly improved; and in 1643 he was entered at Peterhouse, Cambridge, under his uncle, Isaac Barrow, then a fellow of that college, and finally Bishop of St Asaph. In 1645, before he had come into residence, his uncle was ejected; so he went instead to Trinity College, where he became B.A. in 1648, fellow in 1649, and M.A. in 1652. Finding that to be a good theologian he must know chronology, that chronology implies astronomy, and astronomy mathematics, he applied himself to the latter science with distinguished success. To the classics he had already devoted much study, and on the vacancy of the Greek chair (1654), he was recommended for the office; but a suspicion of Arminianism is said to have interfered with his success. After this disappointment he went abroad (1655), and travelled four years through France and Italy, to Smyrna and Constantinople, back to Venice, and home through Germany and Holland. On the voyage from Leghorn to Smyrna, his determined personal courage seems to have been instrumental in scaring away an Algerine pirate, after a brisk exchange of shots. Soon after his return he took orders (1659), and in the following year was appointed professor of Greek. In 1662 he received the chair of Geometry at Gresham College, London, which, on his appointment to the Lucasian professorship of Mathematics at Cambridge (1663), he thought it his duty to resign. The latter also he resigned in 1669, in favour of his pupil Isaac Newton. On quitting his professorship, he obtained from his uncle a small sinecure in Wales, and from Dr Seth Ward, Bishop of Salisbury, a prebend in that cathedral. He devoted the revenues of both to charitable purposes, and resigned them in 1672, on being appointed by the king Master of Trinity College. To him, while in this office, is

due the foundation of the Trinity library, which is one of the chief ornaments of Cambridge. In 1675 he was nominated vice-chancellor of the university; in 1677 he died on a visit to London, and was buried in Westminster Abbey. He was only 47, but by his writings and the force of his personal character, he had achieved a reputation which time has left unimpaired. Of his mathematical works, the principal are his *Lectiones Geometricæ* and *Lectiones Opticæ*, on which his contemporary fame was chiefly based, and which show him as an immediate precursor of Newton and Leibnitz. As a theologian, his fame rests mainly on his posthumous *Treatise on the Pope's Supremacy*, and on his eloquent sermons, unmatched as specimens of clear, exhaustive, vigorous discussion. Their length, we may add, was excessive. One, on charity, lasted three hours and a half; and at Westminster Abbey, he once detained the audience so long that they got the organ to play 'till they had blowed him down.' Far the best edition of Barrow's English theological works is that by the Rev. A. Napier (9 vols. Camb. 1859), with a memoir by Dr Whewell, who in 1860 also edited his Latin mathematical works, some of which have been translated.

Barrow, Sir John, was born of humble parentage at Dragley Beck, Lancashire, in 1764, and educated at Ulverston. Having for three years been timekeeper in a Liverpool iron-foundry, he made a voyage (1781) on a Greenland whaler, and after his return taught mathematics in a school at Greenwich. In 1792 he received the post of private secretary to Lord Macartney, ambassador to China; and he availed himself of his residence in China to learn the Chinese language, and to collect valuable materials, which he afterwards gave to the world, partly in articles in the *Quarterly Review*, and partly in his *Travels in China* (1804). When in 1797 Lord Macartney became governor of Cape Colony, Barrow made extensive excursions in the interior, which he described in his still valuable *Travels in Southern Africa* (1803). In 1804 he was appointed by Lord Melville secretary to the Admiralty, which situation he retained till 1845, except for a short time in 1806. Barrow also published *A Voyage to Cochin-China* (1806), *The Life of Macartney* (1807), *A Chronological History of Voyages into the Arctic Regions* (1818), *Voyages of Arctic Discovery* (1846), besides a series of lives of naval worthies. Under Peel's ministry, in 1835, he received a baronetcy. In 1845 he retired from public service, and he died in London, 23d November 1848. He rendered signal service to geographical science by suggesting and promoting Arctic expeditions; and Barrow Strait, Cape Barrow, and Point Barrow preserve his memory. He may also be claimed as the founder of the Geographical Society (1830), of which he was vice-president till his death. See his Autobiography (1847), and the Memoir by Staunton (1852).

Barrow-in-Furness, a seaport and manufacturing town of North Lancashire, situated on the south-western coast of the peninsula of Furness, opposite a small island called Barrow Island (traditionally a burial-place of Norse rovers), now forming part of the port. Barrow-in-Furness is 20 miles WNW. of Lancaster, and 265 NNW. of London. In 1847 it was a fishing-village of 325 inhabitants; in 1864 the population had risen to 10,608, in 1871 to 18,245, in 1881 to 47,111, and in 1921 to 74,254. This rapid increase, matched in Great Britain by few towns far from London, is owing to Mr H. W. Schneider's discovery in 1840 of extensive deposits of rich hæmatite ore at Park, near Barrow; to the establishment of mines, smelting-works, shipbuilding yards, &c.; and to the laying of railways throughout the district (famed for its lake scenery), the Furness Railway Company having constructed 108 miles of line during 1846–47. In 1859 smelting-works were established; in 1866 these were amalgamated with the Bessemer Steel Company, founded three years before, as the Barrow Hæmatite Iron and Steel Company, which ere long had 14 blast-furnaces in operation, turning out yearly 360,000 tons of pig-iron and 220,000 tons of Bessemer steel. Copper and slate are also found in the neighbourhood.

The town is built on a regular plan, mostly in rectangles, with broad streets, traversed by electric tramways. In 1872 a statue was unveiled of the first mayor, Sir James Ramsden, and in 1885 one of Lord Frederick Cavendish. The town-hall was built in 1887. There are a technical school (1911), a school of science and art, besides higher-grade schools and girls' schools.

The Dukes of Devonshire and Buccleuch are the principal landowners of the town and neighbourhood. The docks, covering 278 acres of water-space and 24 feet in depth, belong to the Furness Railway Company. The Devonshire (32½ acres) and Buccleuch (31 acres) docks were opened by Mr Gladstone in 1867; in 1877 were added the Ramsden Dock (60 acres), used by the Anchor Line, and the Cavendish Dock (146 acres), which was leased to Messrs Vickers for airship purposes. Among other equipments there are large lifting and graving docks and cranes. Barrow Island has since 1871 become the seat of great shipbuilding yards. Messrs Vickers' works on the island extend over 100 acres. This firm, which employs thousands of hands, has accommodation for building, at one time, about a score of merchant or war ships of the largest type, and turns out in addition boilers, oil-engines, huge guns, shells, and all manner of machinery and munitions on a vast scale. On Walney Island it has an airship-factory and a colony, Vickerstown (founded 1901), for its work-people. Walney Island (ten miles long by one wide) is separated from the mainland at Barrow by a narrow strait, which in 1908 was bridged by a great structure, 1123 feet long, with an opening span of 120 feet. Flax and jute works were erected in 1872. There are besides engineering, furnace-building, boiler-making, paper-pulp, and other works, brewing, petroleum-stores, timber-yards. The imports include timber, ore, coal, flour, grain, petroleum, and preserved provisions. The chief exports are ore, steel rails, and pig-iron. A regular passenger service is maintained with Belfast. Thanks to its docks, railway, mineral wealth, and industries, Barrow may claim to command the 'sinews of war' and the material sources of permanent peace-time well-being for its inhabitants. The interesting ruins of Furness Abbey lie within 2 miles of the town; while on Piel Island there are the ruins of the Pile of Fouldrey, built in Stephen's reign by the Abbot of Furness. A municipal borough (1867), county borough (1888), Barrow since 1885 has returned one member to parliament.

Barry, (1) a small island in the Bristol Channel, off the south coast of Glamorganshire, 12 miles SW. of Cardiff. It has the ruins of an ancient castle and of two chapels.—(2) A town and important seaport opposite Barry Island, 7 miles SW. of Cardiff by rail, in the Llandaff and Barry parliamentary division of Glamorganshire. It has extensive docks, covering an area of 120 acres between the town and the island, with about 40 coaling-tips, and having direct railway communication with all the South Wales coalfields. The first dock was opened in 1889, when Barry was a village with 70 inhabitants. Since that time the coal traffic has increased manifold The docks are open at all states of the tide, and there is extensive graving accommodation. The municipality

owns the gas and water works, maintains public schools, libraries and reading-rooms, public parks, hospitals, and a sanatorium. The town, with the island, is also becoming a favourite seaside resort. Pop. 40,000.

Barry, COMTESSE DU. See DU BARRY.

Barry, SIR CHARLES, R.A., F.R.S., architect, was born at Westminster in 1795, visited Italy, and by 1823 was a well-known architect. He built Manchester Athenæum, Grammar-school at Birmingham, the Travellers' Club and the Reform Club, and the College of Surgeons. His design for the new houses of parliament was selected (1836), but he died (12th May 1860) before their completion by his son, Edward Middleton Barry (1830–80). See the Life of Sir Charles Barry by his second son, Alfred Barry, Bishop of Sydney and Primate of Australia.—Another son, SIR JOHN WOLFE WOLFE-BARRY, K.C.B., F.R.S., born in 1836, became one of the most eminent engineers of his time, his works including the Blackfriars and Tower bridges, docks at Barry, Hull, and Middlesbrough, and railway works in India, China, and elsewhere. He died 22d January 1918.

Barry, ELIZABETH (1658–1713), created over 100 rôles in tragedy and comedy, including some of the most famous characters of Otway's and Congreve's plays. Of her life little is known. She is said to have been introduced to the stage by Rochester, and to have been a very unpromising pupil.

Barry, JAMES, an historical painter, born at Cork, 11th October 1741. He was a protégé of Edmund Burke, through whose liberality he studied for about four years in Italy (1766–70). On his return he was chosen a member of the Royal Academy, and in 1782 professor of Painting. He was of irritable temper, quarrelled with the Royal Academy, and was expelled. He died in poverty on 22d February 1806. His *chef-d'œuvre* is the 'Victors at Olympia,' one of six paintings to ornament the room of the Society of Arts. His letters and writings on art were published with a memoir by Fryer in 1809.

Barry, MARTIN, a physiologist of eminence, was born at Fratton, Hampshire, in 1802. He studied at the medical schools of London, and at several on the Continent, and took his degree of M.D. in Edinburgh in 1833. He wrote much on physiological subjects, and especially on animal development and embryology. He was elected a member of the Royal Society in 1840. In 1844 he was appointed house-surgeon to the Royal Maternity Hospital, Edinburgh. His means being ample, he gave his professional services largely to the poor. In 1853 he settled at Beccles, in Suffolk, where he died in April 1855.

Barry, SPRANGER (1719–77), born in Dublin, was first a silversmith, then a successful actor, came to London and acted with Garrick, whose rival he subsequently became. He was great in *Hamlet* and *Macbeth*, and as Romeo (to Mrs Cibber's Juliet). His wife, Ann Street (1734–1801), widow of an actor named Dancer, was a distinguished actress.

Barry. See HERALDRY.

Barry Cornwall. See PROCTER (BRYAN WALLER).

Bar-sinister. See BATON-SINISTER.

Bar-sur-Aube, a small town of France, in the department of Aube, situated on the right bank of the river of that name, 137 miles ESE. of Paris by rail. It has a pop. of 4000, employed in weaving and the manufacture of brandy. Here a council of the allied sovereigns was held on 25th February 1814; and here, two days after, the French were defeated by the allies.

Bar-sur-Seine, an ancient town of France, in the department of Aube, pleasantly situated on the left bank of the Seine, 21 miles SE. of Troyes by rail. There are glass-works, paper-mills, and tanneries. Pop. 3000.

Bartas, GUILLAUME DE SALUSTE DU, soldier, diplomatist, and man of letters, was born at Montfort, in Armagnac, in 1544, and died in 1590 of wounds received at the battle of Ivry. His chief poem, *La Sepmaine*, gives an account of the creation, and is said to have had a considerable influence on Milton's *Paradise Lost*. Thirty editions of the work passed through the press in six years. Joshua Sylvester (1563–1618) Englished *Du Bartas his Divine Weeks and Works* (1598).

Barter, in commerce and political economy, a term used to express the exchange of one commodity for another, as contrasted with the sale of commodities for money. It is simply a primitive form of exchange carried on in countries in which the use of money has not yet been introduced or is not prevalent. It was an economic stage through which all communities must have passed. Even yet in many rude countries barter is very common; and European travellers find it convenient to take with them weapons, tools, and ornaments to exchange with the natives for their commodities. In civilised communities barter is a very exceptional thing, having been superseded by the use of money in various forms.

In law, barter, or exchange, as it is now more generally called in law-books, is a contract for transferring property, the consideration being some other commodity; or it may be described as a contract for the exchange of two subjects or commodities. It thus differs from *sale*, which is a contract for the transference of property in consideration of a price in *money*. See EXCHANGE; SALE OF GOODS.

Bártfa, BARTFELD, or BARDIOV, a small but very old town of Czechoslovakia, on the river Topla, near the borders of Galicia. Its hot baths have properties like those at Spa. Pop. 7000.

Barth, a seaport town of Prussia, 21 miles W. of Stralsund, at the mouth of the Barth, which forms its harbour; pop. 10,000.

Barth, HEINRICH, one of the greatest modern scientific travellers, was born at Hamburg, 16th February 1821. He studied at Berlin, and, after visiting Italy and Sicily, in 1845 passed over to Tangier in Africa, and made excursions into the interior, to Tunis, Tripoli, and Bengazi. On his journey thence to Cairo, he was attacked, wounded, and plundered by a band of Arab robbers. He afterwards extended his researches into Egypt, Sinai, Palestine, Asia Minor, and Greece. An account of part of these travels appears in his *Wanderungen durch die Küstenländer des Mittelmeeres* (1849). He was next appointed by the British government, along with Dr Overweg, scientific companion to Mr James Richardson, at that time charged with a political and commercial mission to Central Africa. Starting from Tripoli early in 1850, Dr Barth and his companions crossed the Great Desert amid many difficulties and dangers. Barth soon separated from his friends, who both succumbed to the climate, and continued his explorations, which extended from Tripoli in the north to Adamáwa in the south, and from Bagirmi in the east to Timbuktu in the west, upwards of 12,000 miles. The result of his researches appeared in his *Travels and Discoveries in Central Africa*, 5 vols. (1857–58). Afterwards he made several journeys in Greece, Turkey, and Asia Minor. He died at Berlin, November 25, 1865. In 1858 appeared a book on his travels in Asia Minor, and in 1862–66 his great

work on the vocabularies of the Central African tribes.

Barth, or BART, JEAN, a French naval hero, the son of a fisherman, born in 1651 at Dunkirk, served first in the Dutch navy under De Ruyter, but on the commencement of the war with Holland passed over to the French service. As his humble birth made promotion hopeless, he became captain of a privateer, and distinguished himself so greatly that Louis XIV. at last appointed him lieutenant of a man-of-war. In 1691 he commanded a small squadron in the North Sea, where he destroyed many English vessels, and made a descent on the coast near Newcastle. In 1694, after a desperate struggle with a superior Dutch fleet, he recaptured a large flotilla of corn-ships, and steered them safely into Dunkirk. Soon after, being caught at a disadvantage by the English, he was taken prisoner and carried to Plymouth, but he soon managed to make his escape in an open fishing-boat to France. The king received him with distinction at Versailles, but at the same time spoke continually of the mischance which had befallen him the year before. Stung by this, Barth hastened to Dunkirk, and in spite of the blockade of the harbour by the English, undertook a cruise in which he was remarkably successful. At a personal audience in 1697, Louis XIV. appointed him to the command of a squadron, on which the honest seaman bluntly thanked the king in the words: 'Sire, you have done well in this.' The courtiers were shocked at the freedom of the speech; but the king took the answer in good part, and Barth soon justified his confidence. The peace of Ryswick terminated his active career. He died at Dunkirk, April 27, 1702. His rough frankness and coarse wit, which spared neither high nor low, made him popular, no less than his boldness and readiness for battle.

Barthélemy, AUGUSTE MARSEILLE, a French poet and politician, was born at Marseilles in 1796. Educated at the Jesuit College of Juilly, he came to Paris in 1822, and soon made himself famous by a series of vigorous and pointed political satires in verse, directed against the Bourbons, and full of suggestive regrets for the glories of the empire. In *Napoléon en Egypte* (1828), and still more in his elegy for Napoleon's son, *Le Fils de l'Homme* (1829), he spoke out his imperialism more boldly, and the latter occasioned his imprisonment on the eve of the revolution of July. His liberation of course was immediate; and along with his friend Méry, he celebrated the victory of the people in a poem dedicated to the Parisians, and entitled *L'Insurrection.* During all the changes which followed, Barthélemy was indefatigable as a brilliant versifier on the political events of the day; though, in his later years, his popularity somewhat declined. He was, from the first, a warm supporter of the second Napoleonic régime. Some of his sayings are memorable, as the oft-quoted, 'L'homme absurde est celui qui ne change jamais.' His death took place, 23d August 1867. at Marseilles, of which city he was librarian.

Barthélemy, JEAN JACQUES, a learned French antiquary, born 20th January 1716, at Cassis, in Provence. Educated for the church, he early devoted himself entirely to the study of oriental antiquities, especially numismatics, but he retained the dress and title of an abbé. In 1745 he became attached to the Royal Cabinet of Medals, and in 1753 was appointed its director. Next year he visited Rome in the suite of M. de Stainville, the French ambassador, who, as Duc de Choiseul, became French minister in 1758, and soon after, by means of a liberal pension, placed Barthélemy in a position to devote himself entirely to learned researches, which he quietly pursued till the revolution of 1789 deprived him of his offices. In September 1793 he was imprisoned on charge of being an aristocrat, but almost immediately released. Shortly after, he was offered the situation of national librarian then vacant, but his age and infirmities compelled him to decline it. He died April 30, 1795.

His most celebrated and popular work is the *Voyage du jeune Anacharsis en Grèce dans le Milieu du quatrième Siècle avant l'Ère Chrétienne* (4 vols. 1788), which shows an extensive knowledge of the ancient world, especially of Greece and its colonies, and abounds in observations which, if not profound, are at least judicious. Later and more severe criticism has, however, pointed out many deficiencies and anachronisms. It has been translated into almost every European language. Among Barthélemy's other works may be mentioned *Réflexion sur quelques Monuments Phéniciens* (1750), and *Réflexion sur l'Alphabet et la Langue de Palmyre* (1754). The first complete edition of his works was that of Villenave (4 vols. 1821), with a biography.

Barthélemy Saint-Hilaire, JULES, French savant and statesman, was born at Paris on the 19th of August 1805. On the completion of his studies he filled for some time a subordinate office under the minister of finance, while actively contributing as a liberal publicist to such newspapers as the *Globe* and the *Nation.* About the close of 1833 he turned from political strife to quieter studies, and in 1838 was appointed to the chair of Greek and Roman Philosophy in the Collège de France. In 1839 he became a member of the Academy. The revolution of February 1848 brought him once more into the political arena. He entered the Assembly, and became one of the leaders of the moderate party. At the *coup d'état* he was one of the patriots who were arrested and flung into prison. On his release he resigned his chair, as he could not take the oath of allegiance to Napoleon III., and returned to his studies, especially Sanskrit and ancient Indian philosophy. Elected in 1871 to the Assembly at Bordeaux, he gave constant support to Thiers. In 1876 he was elected a life-senator by the Assembly; and he held the portfolio of foreign affairs in Ferry's ministry, 1880–81.

His most important work is his French translation of Aristotle, various parts of which appeared from 1837 to 1883. Next to this are his contributions to western knowledge of Indian philosophy in the works, *Sur les Védas* (1854), *Du Bouddhisme* (1855), *Le Bouddha et sa Religion* (1859), and in numerous contributions to the *Mémoires* of the Academy and the *Journal des Savants.* He translated the *Iliad* in verse (1869), and wrote on the Alexandrian school, on Mohammed, on British India (1887), on science and religion (1889), and on Lord Bacon (1890); and at his death, 25th November 1895, was finishing a translation of Plato.

Barthez, PAUL JOSEPH, a French physician, was born December 11, 1734, at Montpellier, where he settled as a professor, in 1785 as chancellor of the university, and where consultations with him on serious cases were sought from all parts of the civilised world. The Revolution deprived him of the greater part of his property; but Napoleon heaped honours and dignities upon him in his old age. He died October 15, 1806. Of his numerous writings, his *Nouveaux Éléments de la Science de l'Homme* (Montpell. 1778; 3d ed. Paris, 1858) was translated into most of the languages of Europe, and strongly supports the theory of vitalism and formative force.

Bartholdi, Auguste, sculptor, a native of Colmar, Alsace, of Italian ancestry on his father's side, was trained in the studio of Ary Scheffer, and amongst other works has executed the Lafayette statue, New York; Vercingetorix, the Gaulish leader, now in the galleries of the French government; the 'Lion of Belfort,' and 'Grief.' That France should present to America some symbol in connection with the centenary of American independence occurred to him in 1874; the scheme took shape, and in November 1886 the gigantic bronze statue, 220 feet high, of 'Liberty enlightening the World,' completed in 1884, was unveiled on Bedloe's Island, New York Harbour. Bartholdi, who was born in 1834 and died in October 1904, received the cross of the Legion of Honour in 1887.

Bartholin, Kaspar, born in 1585 at Malmö; studied theology and philosophy at Rostock and Wittenberg, and in 1610 was made doctor of medicine at Basel. He practised for some time in Wittenberg, and in 1613 accepted an invitation to be professor of the Greek Language and of Medicine at Copenhagen, where in 1624 he became professor of Theology. He died at Sorö in 1629, after having written nearly fifty works on various subjects.—Thomas Bartholin, son of the above, and equally celebrated as a philologist, naturalist, and physician, was born in 1616. He became in 1647 professor of Mathematics at Copenhagen, and in 1648 was nominated to the chair of Anatomy. He died in 1680. He enlarged his father's *Anatomy* (1641) with new observations, and defended Harvey's doctrine of the circulation of the blood.

Bartholomæus Anglicus. See Encyclopædia; and Steele's *Mediæval Lore* (1893).

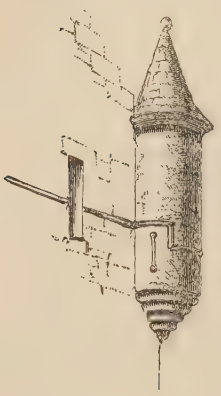
Bartholomew, St, one of the twelve apostles, supposed to be the same person as Nathanael, and was a native of Galilee. According to the traditionary record of Eusebius, he carried Christianity into India; Chrysostom speaks of him as a missionary in Armenia and Asia Minor. The church at Rome bearing his name claims to preserve his relics. The Roman Church holds his festival on the 24th August; the Greek on the 11th June. The primitive church possessed an apocryphal gospel under his name, but it is now lost.

Bartholomew, Massacre of St (Fr. *La St-Barthélemy*), the appellation given to the massacre of the Huguenots in Paris on the night of St Bartholomew's Day, 24th August 1572. After the death of Francis II. in 1560, Catharine de' Medici assumed the management of affairs, as regent for her son, Charles IX., and showed throughout a more than Italian craft and faithlessness, as well as a cruelty almost without parallel in modern history. In order to annoy the Catholic party of the Duke Francis of Guise, she granted an edict of toleration to the Reformed, at whose head was the Prince of Condé. Both parties took up arms, and there ensued a war which lasted for eight years, the cruelties of which, through mutual exasperation, are almost incredible. Guise was assassinated, and Condé was taken prisoner in the battle of Jarnac and shot (1569). His nephew, young Henry of Béarn, afterwards Henry IV., then became leader of the Huguenots, along with Admiral Coligny. It was not till the strength of both sides was exhausted, that the peace of St Germain-en-Laye was concluded in 1570, whereby the Huguenots obtained the free exercise of their religion. Catharine de' Medici, using one party after another for her own purposes, like the Machiavellian she was, pagan rather than Catholic, brought about the marriage of the youthful Henry of Béarn with her daughter Margaret, 18th August 1572. The king, a weakling easily swayed from one side to another, at this time held Admiral Coligny in high favour, and had assigned him an important place in the council of state. When the marriage of Prince Henry had attracted the most eminent of the Huguenots to Paris, Admiral Coligny was shot in the street on 22d August 1572. The king swore to avenge him, but on the very same day was persuaded by his mother (who feared Coligny's influence over her son) that the admiral sought his life. 'By God's death!' he exclaimed, 'let the admiral be slain, and not him only, but all the Huguenots, till not one remains that can give us trouble!' That night Catharine held a council, resolved with the Guises to get their blow in first, and appointed St Bartholomew's Day for carrying into effect a massacre of Huguenots—now for the first time fairly contemplated. A bell in the tower of St Germain l'Auxerrois, at half-past one, summoned the citizens to arms, and rumours that the king was murdered led to the general massacre. The king himself is popularly represented as having fired from his palace upon those that were fleeing past. The Prince of Condé and the king of Navarre went to mass, and were said to have saved their lives by conforming to the Catholic church. The country was at the same time summoned to similar slaughter; and there were found bloodthirsty fanatics enough to perpetrate the greatest horrors for several weeks in almost all the provinces. The numbers of the slain as given by various reporters vary widely—from 2000 to 100,000. A modern estimate is rather more than 5000 for all France. It was reported at home and abroad that an attack on the king had been repulsed with great loss to the Huguenots. Queen Elizabeth as well as Philip II. sent congratulations to the French court; and the pope celebrated St Bartholomew's Day by a procession to the church of St Louis, a grand *Te Deum*, the striking of a medal, and the proclamation of a year of jubilee. But the crime was useless. The Huguenots had lost their chiefs, but, the first moment of stupor past, they took up arms with all the fury of despair; the royal troops were once more foiled in their attempts to take Rochelle; and Charles found himself forced to grant liberty of conscience. See books by White (1868) and Baumgarten (1882); histories of France by Martin, Duruy, Lavisse, &c.; Sully's Memoirs; and the works cited at Huguenots and at Catharine de' Medici.

Bartholomew Fair, held at West Smithfield, London, from 1133 till 1855, the charter for it having been granted by Henry I. to a monk named Rahere, who had been his jester, and had founded the priory of St Bartholomew (see below). The fair was held annually at the festival of St Bartholomew (August 24, old style); but in 1753, owing to the alteration of the calendar, it was for the first time proclaimed on 3d September, having in 1691 been curtailed from fourteen to four days. In the first centuries of its existence, Bartholomew Fair was one of the great annual markets of the nation, and the chief cloth-fair of the kingdom. Its articles of traffic were besides cloth stuffs, leather, pewter, and live-stock; while it was rendered attractive to the crowds that attended it by a variety of popular amusements. All manner of shows, exhibitions, theatrical booths, &c. thronged the fair; and tumblers, acrobats, stilt-walkers, mummers, mountebanks, and merry-andrews resorted to it in great numbers. In 1685 the fair was leased by the city to the sword-bearer, and thenceforth it began to decay as a place of trade. In 1840 the exhibitions were removed to Islington; in 1850 the last proclamation by the lord mayor took place, and in 1855 the once famous fair came to an end. See Professor H. Morley's *Memoirs of Bartholomew Fair* (1859) and Ben Jonson's play.

Bartholomew's (St) Hospital, Smithfield, London, was founded in 1123 by Rahere, the first prior of the Convent of Augustinian Canons, which he founded on Smithfield. The present church of St Bartholomew the Great was the choir of the priory church. An ancient chapel originally dedicated to the Holy Cross, partly rebuilt in 1823, is now the parish church of St Bartholomew the Less. After the dissolution of the monasteries, the hospital stood empty for eight years; but it received fresh charters in 1544 and in 1547, escaped the fire of 1666, and was rebuilt in 1729, with additions in 1865 and 1881. On the migration of Christ's Hospital (q.v.) part of that property was acquired for much needed extensions and reconstructions. There is an important medical school attached.

Bartizan, a small, overhanging, battlemented, parapet turret, projecting from the angles on the top of a tower. It was generally pierced with apertures for cross-bowmen, called *balistraria*. *The New English Dictionary* says that the word is a spurious 'modern antique,' which had no existence in the times to which it is attributed. It was apparently first used by Sir Walter Scott, and was due to a misconception of a 17th-century illiterate Scots spelling, *bertisene*, for 'bertising'—i.e. *bretising*, or *bratticing*, a *brattice* being a battlemented parapet, originally of wood, and temporary.



Bartizan.

Bartlett, John Russell, American author, was born at Providence, Rhode Island, U.S., 23d October 1805. For a time in a banking-house there, in 1837 he became a bookseller in New York, giving his leisure to history and ethnology. He assisted in founding the American Ethnological Society, and was secretary of the New York Historical Society. He was employed by the United States government in 1850–53 as a commissioner for determining the Mexican boundary-line, and in 1854 published an account of his explorations and adventures in that capacity. In 1855 he became Secretary of State of Rhode Island, and in 1861–62 he was its acting governor. He was the author of *The Progress of Ethnology*, a *Dictionary of Americanisms* (enlarged ed. 1878), *Primeval Man* (1868), *Bibliotheca Americana* (4 vols. 1865–70), &c. He died 28th May 1886.

Bartlett, William Henry, artist, born in London in 1809, was a pupil of Britton, the architect, who afterwards employed him to make drawings for his *Cathedral Antiquities* and *Picturesque Antiquities of English Cities*. Subsequently Bartlett visited the Continent, the Holy Land, and America several times, on each occasion enriching his portfolio with innumerable interesting scenes. No fewer than nineteen quarto volumes, containing about 1000 engravings from his sketches, and letterpress from his own pen and those of his fellow-travellers, Dr W. Beattie, N. P. Willis, and Miss Pardoe, were devoted to these countries. Bartlett died on the voyage from Malta to Marseilles, 13th September 1854.

Bar'toli, Taddeo, an Italian painter of the Siennese school (1362–1422).—Daniello Bartoli, a learned Jesuit, was born at Ferrara in 1608, and died rector of the Jesuit College at Rome in 1685. His chief work is the *Istoria della Compagnia di Gesù* (1653–73).—Pietro Santo Bartoli (sometimes called 'Perugino'), born 1635, died 1700. He was a painter after the manner of Poussin, and a skilful etcher.

Bartoli'ni, Lorenzo, a celebrated Italian sculptor, was born at Vernio, in Tuscany, in 1777, and came to Paris while still a young man. His chief patron was Napoleon, who in 1808 sent him to Carrara, to establish a school of sculpture. After the battle of Waterloo he repaired to Florence, where he died in 1850. Besides an immense number of busts, he produced several groups, the most celebrated of which are his 'Charity' and 'Hercules and Lycus.'

Bartolomme'o, Fra (properly Baccio della Porta), one of the most distinguished masters of the Florentine school of painting, was born at Florence, in Tuscany, in 1469. His first teacher was Cosimo Roselli; but he owed his higher cultivation to the study of the works of Leonardo da Vinci. His subjects are mostly religious, and by far the greater part of his pieces belong to the later years of his life. He was a warm adherent of Savonarola, after whose tragical end he in 1500 assumed the monkish habit. The visit of the young Raphael to Florence in 1504 seems to have been instrumental in stimulating him to resume his art. He imparted to Raphael his knowledge of colouring, and acquired from him a more perfect knowledge of perspective. The two remained constant friends—Bartolommeo on one occasion finishing certain of Raphael's unfinished works, Raphael performing a like kindness for him at another time. Bartolommeo died at Florence, 1517. The greater number of his works are to be seen at Florence, in the gallery of the Pitti Palace, but the Louvre possesses a fine 'Annunciation' by him. See books by Frantz (Ratisbon, 1879), Leader Scott (Lond. 1880), Gruyer (Paris, 1886), and Knapp (Halle, 1903).

Bartolozzi, Francesco, an eminent engraver, was born in Florence, September 21, 1727. After practising his art under Joseph Wagner at Venice, he went to Rome, where he executed his admired plates from the life of St Vitus. He was afterwards commissioned by Mr Dalton, librarian of George III., to engrave a series of drawings by Guercino, and was induced by the same patron to settle in England. Here Bartolozzi produced his exquisite line engravings of 'The Silence' and 'Clytie,' after Annibale Carracci, which entitle him to occupy the front rank in his profession. He also engraved numerous specimens of the works of his friend Giovanni Cipriani, of Michelangelo, Carlo Dolci, Sirano, and others, with equal truth and effect. He likewise enriched Alderman Boydell's Shakespeare Gallery with many fine engravings. In 1769, on the formation of the Royal Academy, Bartolozzi was nominated one of the original members, and executed, from a design by his friend Cipriani, the diploma, which is still in use, and ranks as one of his masterpieces. In 1802 he accepted a flattering invitation from the Prince Regent of Portugal, to take the superintendence of a school of engravers at Lisbon, whither he repaired three years afterwards in his seventy-eighth year, and there resided until his death, March 7, 1815. He was the grandfather of the celebrated actress, Madame Vestris. His prints are said to be more numerous than those of any other engraver, and include line engravings and stippled works, printed in brown and red.

Bartolus of Sassoferrato, jurist, was born at Sassoferrato in 1314, studied at Perugia and Bologna, was professor of Civil Law at Perugia from 1343, and died there in 1357. He wrote on procedure and on evidence, and commented on Justinian's code. See a study by Woolf (1913).

Barton, ANDREW, a famous Scottish naval commander of the time of James IV., was killed in an engagement with two English ships in the Downs, 2d August 1511.

Barton, BERNARD, Quaker poet, and friend of Lamb, was born in 1784. In 1809 he became clerk to a bank at Woodbridge, a post which he held till within two days of his death, 19th February 1849. His *Metrical Effusions* (1812) brought him into correspondence with Southey; whilst *Poems by an Amateur* (1818), *Poems* (1820), and several more volumes of verse increased his reputation. His devotional poems have an echo of George Herbert, and some of his lyrics are graceful; but he is on the whole less a poet than a versifier, easy and pleasant withal. Lamb's advice to him was, 'Keep to your bank, and your bank will keep you;' and by Lamb's advice he accepted the sum of £1200, raised by Quaker friends in 1824. See his *Poems and Letters* (1849), selected by his daughter, with memoir by her husband, E. FitzGerald, and Lucas's *Bernard Barton and his Friends* (1894).

Barton, SIR EDMUND, the first Prime-minister of the Commonwealth of Australia, was born in Sydney in 1849. He entered the State Parliament in 1879, and was Speaker of the Assembly in 1883–87. In 1891 he took a leading part in the debates of the first Federal Convention, and was elected at the head of the poll for delegates to the convention of 1897–98. His continuous active work in the federation campaign (of which he was the Aaron rather than the Moses) resulted in his being given the task of forming the first Federal Cabinet, over which he presided till 1903, being then made senior puisne judge of the new High Court. The distinguishing qualities which raised him from the ruck of politicians to be one of the few genuine Australian statesmen were a dignity and a sagacity for whose development the federation campaign gave full opportunity; while his very concentration on this great work kept him too far aloof from ordinary political life to be, as prime-minister, a satisfactory representative of Australian ideas on current affairs. Hence the naval agreement of 1902, for which he was responsible, was in Australian eyes a failure, and the judgeship came as a fitting close to his political career. He died 6th January 1920.

Barton, ELIZABETH, the nun or maid of Kent, was born in 1506, and about 1525, when a domestic servant, in the course of recovery from an illness, fell into nervous derangement and religious mania. When her illness left her, she still continued her trances and prophetic utterances, and Archbishop Warham sent two monks to examine her. One of these, Edward Bocking, seeing here a rare opportunity for reviving popular respect for the Catholic Church, instructed her in the controversial points and in the legends of the saints. Soon afterwards she became an inmate of the priory of St Sepulchre at Canterbury, but Bocking continued to be inspirer of her revelations. As soon as the divorce of Henry VIII. began to be discussed, the nun denounced it 'in the name and by the authority of God,' and threatened the king with death if he persisted in his purpose. Warham was convinced by her earnestness, Wolsey gave her an audience, Sir Thomas More listened to her more than once, and Bishop Fisher wept with joy over her revelations. The king's marriage to Anne Boleyn (1533) and subsequent immunity destroyed her credit. Under Cranmer she was 'put to the question,' and ultimately confessed that 'she never had visions in all her life, but all that she ever said was feigned of her own imagination only, to satisfy the minds of those which resorted to her, and to obtain worldly praise.' Put on trial for high treason, she was condemned and executed at Tyburn with Bocking and four other accomplices on the 20th of April 1534.

Barton Clay. See EOCENE.

Barton-upon-Humber, an ancient town of Lincolnshire, on the south side of the Humber, 7½ miles SW. of Hull; pop. 6500.

Bartram, JOHN (1699–1777), the first American botanist of eminence, was born of Quaker stock near Derby, Pa., was botanist in America to George III., corresponded with Linnæus from his home near Philadelphia, established in the Schuylkill the first botanic garden in the colony, and wrote on his observations. His son William (1739–1823) was a botanist and ornithologist.

Bartsch, KARL (1832–88), born at Sprottau, in Silesia, became professor of German and Romance Philology at Heidelberg, edited the Nibelungenlied, the songs of Poland, translated Burns and Dante, wrote poems, and was editor of *Germania*.

Bartsia, a widespread genus of Scrophulariaceæ, close akin to eyebright. Most species, including the British pink-flowered roadside weed *B. odontites*, are partial parasites on grass-roots.

Baru, a fine woolly substance found at the base of the leaves of *Arenga saccharifera*, a sago-palm of the Indian Archipelago, is employed in caulking ships, in stuffing cushions, and the like.

Baruch ('the Blessed'), the son of Neriah, the faithful friend and secretary of the prophet Jeremiah. During the siege of Jerusalem by Nebuchadnezzar he was flung into prison along with the prophet, and found release only on the fall of the city (586 B.C.). He afterwards accompanied his master to Egypt, but of his after-life nothing certain is known. An apocryphal work in the Greek language has come down to us bearing his name, which contains in noble and glowing language a promise of future glory for Israel, and predicts the rebuilding of Jerusalem. There is usually appended to it, as Chapter vi., a letter of the prophet Jeremiah to the exiles in Babylon. There is also an apocalypse, credited to Baruch, extant in a Syriac translation from a Greek version of the original Hebrew.

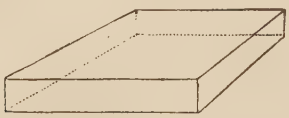
Barwood. See CAMWOOD.

Bary, HEINRICH ANTON DE (1831–88), born at Frankfort, became the supreme authority on algæ and fungi, was professor of botany at Freiburg, Halle, and Strasburg, and wrote important treatises.

Barye, ANTOINE LOUIS, a French sculptor, distinguished mainly for his bronze statues of animals and animal-groups, was born at Paris, 24th September 1795, and was at first an engraver and metal-worker. His famous bronze of a lion struggling with a snake secured for him the cross of the Legion of Honour. He died 27th June 1875.

Bary'ta, or BARYTES, or Oxide of Barium (q.v.)—symbol BaO—is the earth present in the minerals *witherite* (carbonate of barium) and *heavy spar* (sulphate of barium). It may be prepared in several ways: (1) By acting upon the carbonate of baryta, $BaCO_3$, by nitric acid, HNO_3, which causes the disengagement of the carbonic acid, CO_2, and the nitric acid combining with the baryta forms the nitrate of barium, $Ba2NO_3$. On evaporating the latter substance to dryness, and igniting the residue, the nitric acid volatilises, and leaves the baryta, BaO. (2) Another mode of preparing the same substance is to act upon a solution of sulphide of barium, BaS, by the black oxide of copper, CuO, when an interchange of elements occurs, the sulphur uniting with the copper, producing sulphide of copper, Cu_2S, and the oxygen with the barium, forming baryta, BaO, which remains dissolved in the water, and, on evaporation, deposits crystals in the hydrated condition, $BaH_2O_2,8H_2O$. Baryta belongs to the group of

alkaline earths, and has the property of acting like an Alkali (q.v.) on colouring matters. It has a very harsh taste, is highly caustic, and is very poisonous. The presence of carbonic acid gas may be detected by exposing a solution of baryta to the air, when carbonic acid combines with the baryta and forms a film of white carbonate of barium, $BaCO_3$. Baryta exposed to air or oxygen absorbs oxygen, forming peroxide of barium. On this being heated, oxygen is liberated and baryta again produced. Till about 1870 it was found impossible to procure Oxygen (q.v.) by this simple method, as the action became weak when the process was repeated. But the brothers Brin discovered that by carefully removing all carbonic acid gas and water from the air before passing it over the



Crystal of Sulphate of Baryta.

barium, the difficulty is removed, and oxygen is thus economically produced. The *sulphate of baryta*, $BaSO_4$, otherwise called *ponderous* or *heavy spar*, is found in fissures or cracks in other rocks. It is crystalline, and is sometimes found pure and white, but generally presents a flesh-red colour, from the red oxide of iron (rust) incorporated in it. The rust can be got quit of by reducing the sulphate of baryta to a fine powder under rollers or travelling-wheels, and subjecting the pulverised material to the action of dilute sulphuric acid, which dissolves the oxide of iron, and leaves the sulphate of baryta as a white dense powder. The principal use of *heavy spar* is as a pigment under the name of *permanent white;* but having little opacity, it cannot be employed by itself, but only when mixed with ordinary white-lead. When added to the latter, however, it must be regarded as an adulteration, for the little opacity it possesses renders it of service only as an increaser of the bulk of the white-lead. Several mixtures of sulphate of baryta and white-lead are manufactured, and are known in commerce. *Venice White* contains 1 part sulphate of baryta and 1 part white-lead. *Hamburg White* contains 2 parts sulphate of baryta and 1 part white-lead. *Dutch White* contains 3 parts sulphate of baryta and 1 part white-lead. The native sulphate of baryta has been employed by the celebrated potter Wedgwood in the manufacture of jasper ware, and for the formation of white figures, &c. on coloured jars and vessels. The *carbonate of baryta* found native as *witherite*, and the *nitrate of baryta*, have been previously referred to in this article and that on BARIUM.

Bar'yton (Viola di Bardone), an old chamber-instrument, somewhat like the viol di gamba in tone: had a broader finger-board, with six or seven gut-strings, while under the neck there were from nine to twenty-four strings of brass wire, which were pinched with the point of the thumb, to produce a sound, while the gut-strings were acted on by a bow. For the baryton voice, see BARITONE.

Bas, or BATZ, a small island in the English Channel, belonging to France, and situated off the north coast of the department of Finistère. Its length is about 2½ miles, and its breadth about 1¼ mile. It has three villages; a fine haven, that of Kernoc, and a lighthouse. Pop. about 1200, whose chief occupation is fishing.

Basalt. Basalt-rocks are of igneous origin, and are composed essentially of plagioclase felspar, augite, olivine, and generally magnetite or titaniferous iron. They show all varieties of texture, from smooth-compact up to coarsely crystalline, and vary in colour from pale blue up to dark grayish blue, brownish, and black. The vitreous varieties are *Tachylite* and *Hyalomelane;* compact or crypto-crystalline varieties are termed *Basalt;* fine-grained kinds are sometimes called *Anamesite;* while *Dolerite* is the name occasionally given to the more coarsely crystalline kinds. Seen under the microscope, the compact and fine-grained basalt-rocks often show a certain proportion of glassy or devitrified matter lying between the various crystalline minerals of which the rock is chiefly composed. Basalt-rocks are often vesicular and amygdaloidal. Sometimes they occur as lava-flows, at other times they appear as intrusive sheets, dikes, and masses. They are of common occurrence in Britain, more especially in Scotland. As examples of lava-form basalt-rocks may be cited those of Mull, Staffa, and other islands of the Inner Hebrides. Similar lava-form basalt-rocks are well developed in Antrim. Intrusive basalt-rocks are abundant in Central Scotland — Salisbury Craigs, Edinburgh Castle Rock, Dalmahoy Craigs, Abbey Craig, &c. are examples.

The older basalt-rocks have frequently undergone some changes, owing to the chemical action of percolating water. Such altered rocks have often a dull greenish colour, the greenish tinge being due to the conversion of the augite and olivine into green serpentinous and chloritic products. Such more or less altered varieties of basalt-rock sometimes acquire special names—the finer-grained kinds being called *melaphyre*, and the coarser-grained ones *diabase*. When basalt-rocks have been intruded amongst coals or black shales, they often become gray, white, or yellow in colour, and assume a dull earthy appearance. This is the so-called *white-trap*.

There are volcanic masses of Tertiary age which occur in such regions as the Thüringer Wald, Erzgebirge, the Eifel, Italy, &c. which closely resemble basalt-rocks. In these rocks, however, the minerals nepheline and leucite play the part of plagioclase felspar. The rocks, therefore, are known as *nepheline-basalt* and *leucite-basalt*, to distinguish them from ordinary basalt, or, as it is sometimes called, *plagioclase-basalt*. The latter ranges in age from Lower Carboniferous times at least, up to the present; the former are not as yet known from any older stage than the Tertiary.

Basalt-rocks, especially the compact varieties, often assume a columnar structure. This structure, however, is not confined to basalt-rocks. The columns vary in the number of their angles from 3 to 12, but they have most commonly from 5 to 7 sides. In some cases they are more or less perfectly hexagonal. They are generally divided transversely by joints at tolerably equal distances, and in the case of the more perfectly columnar rocks, these joints often show at each articulation a cup and ball socket. The columns are always arranged at right angles to the planes of cooling, so that in the case of an approximately horizontal bed or sheet the columns are vertical, while in the case of a vertical dike, they are horizontal. Various explanations of this remarkable structure have been advocated, none of which can be said to be perfectly satisfactory. The general belief, however, is that they are the result of contraction upon cooling. Two of the best known and finest examples of columnar structure in basalt-rocks are Fingal's Cave in the island of Staffa (q.v.), on the west coast of Scotland, and the Giants' Causeway (q.v.), on the north coast of Ireland.

Basalt-rocks, owing to their toughness and

hardness, and to the fact that their mineral ingredients yield unequally, are much employed for causeway-stones and 'road-metal.'

Base, in Chemistry, is a term applied to a compound body, generally consisting of a metal united with oxygen. Thus, the metal potassium, K, when it combines with oxygen, O, forms the oxide K_2O, which unites with water, yielding the base potash, or caustic potash, KOH; and similarly lead, Pb, and oxygen, yield the base oxide of lead, or litharge, PbO. A distinguishing feature of a base is that it is capable of entering into double decomposition with an acid, more or less neutralising its acid properties, and forming a Salt (q.v.) and water. Thus, the base potash combines with sulphuric acid to form the salt, sulphate of potash, and water, as represented by the equation:

Potash. Sulphuric Acid. Sulphate of Potassium. Water.

$$2KOH + H_2SO_4 = K_2SO_4 + 2H_2O.$$

So also potash and nitric acid, HNO_3, yield the salt nitrate of potassium, or nitre, KNO_3. The metal half of a base may be a compound radicle which, for the time, plays the part of a simple substance. Thus, in ammonium hydroxide, NH_4OH, the compound radicle ammonium, NH_4, behaves as if it were a metal similar to potassium; when it reacts with an acid, a salt is formed with the NH_4 group still intact.

Ammonium Hydroxide. Acid. Ammonium Sulphate. Water.

$$2NH_4OH + H_2SO_4 = (NH_4)_2SO_4 + 2H_2O.$$

The bases potash, KOH, soda, NaOH, ammonia, NH_4OH, baryta, BaO, strontia, SrO, lime, CaO, and magnesia, MgO, are more or less soluble in water; whilst the oxide of iron or rust, Fe_2O_3, and the red oxide of mercury, HgO, are insoluble in water, but soluble in acids. There are organic bases as well as inorganic bases. The more important organic bases are the Amines, Alkaloids, and Amides. They can unite with an acid to form a salt. Thus, aniline unites with hydrochloric acid to form aniline hydrochloride, which is a salt.

Aniline. Hydrochloric Acid. Aniline Hydrochloride.

$$C_6H_5NH_2 + HCl = C_6H_5NH_2,HCl.$$

Base, in Architecture, the foot or lower member of a pillar, on which the shaft rests. See Column.

Base, in Heraldry, the lower portion of the shield. Any figure placed on it is said to be in base. A small portion of the base of a shield parted off by a horizontal line is sometimes called a base.

Base-ball, the American national game, takes its name from the 'bases' arranged on, but is essentially an evolution from the old English schoolboy pastime of Rounders; but unlike the boyish pastime from which it had its origin, it requires manly qualities to excel in it. In base-ball, as in rounders, the players use a bat and a ball, and run around bases, but there all resemblance between the two games ceases. As the game of base-ball is now played, it is full of excitement, and is engaged in with equal zest by schoolboys on an open field, and by trained professional experts on inclosed grounds, presenting to the latter full scope for the exercise of those mental and physical attributes which mark the intelligent and practised athlete.

Cricket and base-ball are coupled in Miss Austen's *Northanger Abbey*, which was written about 1798. In the States, the Knickerbocker Club was founded at New York in 1845, the Excelsior Club at Brooklyn in 1860; but it was not till 1865 that the game became universal.

The theory of base-ball may be briefly summed up as follows: A space of ground, in the form of a diamond, 90 feet square, is marked out on a level field of three or four acres in extent. Bases are placed on or within each angle of the diamond, and are called respectively *home*, *first*, *second*, and *third bases*. Each team consists of nine players, its members taking the bat in regular succession. The man at the bat is termed the batsman, or striker, and his side may be regarded as the defensive force; the field side is the attacking party, and is disposed

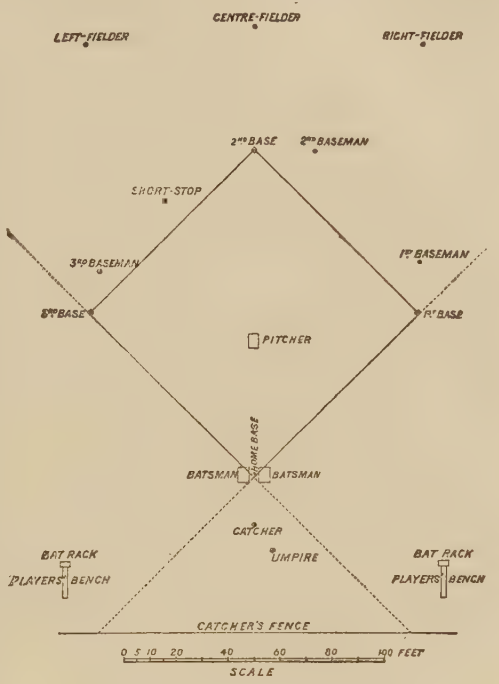


Fig. 1.—Diagram of Base-ball Ground.

as follows: The pitcher, near the centre of the diamond; the catcher, behind the home base; the first baseman, near the first base, to the right of the catcher; the second and third basemen, near the second and third bases; and about midway between these, the short-stop; with out-fielders at right, centre, and left fields, more or less in line with first, second, and third bases respectively.

When play begins, the pitcher delivers the ball, a fair ball being one that passes over the home base, and not lower than the batsman's knee nor higher than his shoulder. Should the batsman fail to strike at a fair ball, or strike at any ball, fair or otherwise, and fail to hit it, or make a foul hit—a hit falling outside the lines of the diamond between the home and first and third bases or continuations of them marked in white on the grass—a 'strike' is called, and after three strikes, the third not being called on a foul hit, the batsman is obliged to run or is put out; on the other hand, four unfair balls delivered by the pitcher entitle the batsman to a base. The batsman endeavours to send the ball out of the reach of the fielders, and far enough out in the field to enable him to make the round of the four bases without being put out, in which case he scores a run. Each base, however, is a resting-place, and he may stop on any base until either he sees an opportunity to steal to the next, or a succeeding batsman sends the ball far enough to enable him to run with safety—for, except when occupying a base, the runner touched with the ball by a fielder is out. All three bases may thus be occupied at once; but when the next batsman becomes a base-runner, the runner on first base must pass on to

second base, which must be vacated to receive him, otherwise he is put out. This rule and another, obliging runners to return and touch the base last occupied when a striker's ball is caught before touching the ground, afford scope for 'double-play,' as a fielder may catch the striker out, and then throw the ball to a base-keeper before another of the same side who is running bases can return. A batsman can only run on a fair hit, but he may be caught out on a foul hit just as on a fair, and if, after a fair hit or three strikes, the ball is fielded to first base before he arrives there, he is out. The first striker is followed by others in rotation at the bat, until three of the batting side are put out, when the field side take their turn at the bat. This goes on until nine equal innings have been played, and then the side scoring the most runs wins the game. It will be readily seen that the theory of the game is very simple, and it is this simplicity of construction which forms one of its chief attractions; and yet to excel in the playing of all the points of the game requires not only the possession of the physical attributes of endurance, agility, and strength, together with good throwing and running powers, and plenty of courage, pluck, and nerve, but also the mental powers of quick perception, thorough control of temper, and the presence of mind to act promptly in critical emergencies of the game.

The weight of the ball used is 5 to 5¼ ounces, its circumference 9 to 9¼ inches; and it is much more elastic than a cricket ball. The bat is round, not more than 2¾ inches in diameter at the thickest part, and must not exceed 42 inches in length.

Fig. 2.—Base-ball Bat.

The ball is delivered by the pitcher with great swiftness, an underhand throw being allowable and very generally employed; and this high speed attained enables a skilful player to send the ball with such a twist or *curve* as will deceive the batsman, and make him think a fair ball bad and an unfair ball good. This effect is obtained by the resistance offered to the ball by the air, and a rotary motion of the ball on its own axis, supplied by the pitcher; and the direction of the curve is determined by the manner in which the ball is delivered from his hand. Curved pitching has been brought to considerable perfection of late years, but a certain want of accuracy makes it advisable for the catcher, when playing close behind the batsman, to wear a strong wire mask, and has produced a rule entitling a batsman who is struck by the ball to take his first base therefor. Prior to 1887, there were no less than four special professional codes of playing rules in use, besides those governing amateurs; but since the beginning of that year, the game has been played under a set of 'National Rules,' agreed to by all players.

The great popularity of base-ball in America has led to the establishment of regular stock-companies, employing a large amount of capital in the business of 'running' professional club teams, whose games are witnessed by many thousands of spectators. What with the college clubs and the amateur organisations of the country, it is safe to say that hundreds of thousands of young men participate in base-ball games during each season, from April to October. Outside of the United States, the game has become popular in Canada, Australia, and Japan; and in the 20th century it has made some advance in England. See books by Chadwick.

Base-bed. See PORTLAND (ISLE OF).

Base-court (Fr. *basse cour*, 'low court'), the lower or outer court of a castle, with offices.

Basedow, JOHANN BERNHARD, educationist, was born 11th September 1723, at Hamburg, where his father was a peruke-maker. He studied at the Johanneum there, and at the university of Leipzig. After tutoring for a time in Holstein, he was in the year 1753 appointed professor of moral philosophy and belles-lettres in an academy at Sorö in Denmark. In 1761 he was removed to the gymnasium at Altona, where, on account of heterodox opinions in theology, he was soon forbidden to teach. Jean-Jacques Rousseau's *Émile* awakened in him, in 1762, the thought of improving the method of education, and of reducing to practice Rousseau's maxims and those of Comenius. Contributions from princes and private persons, amounting to 15,000 thalers (about £2200), covered the cost of his *Elementarwerk*, which was illustrated with 100 copperplates, and was intended to bring the minds of children into contact with realities, and not mere words. As a model school on this method, he established in 1774 the *Philanthropin* at Dessau; but his restlessness of disposition, and his quarrels with his colleagues, led to his withdrawal, and it was finally shut up in 1793. Basedow died at Magdeburg, July 25, 1790. His influence on the public mind of his age, particularly in Germany, was very great, and his numerous works powerfully awakened attention and interest in the much-neglected subject of education. See his Life by Meyer (2 vols. Hamburg, 1792).

Bas'el (Fr. *Bâle;* older Fr. *Basle*), a city and canton of Switzerland. The canton was divided in 1833 into two independent half-cantons, called *Basel-city* and *Basel-country.* The urban half-canton consists only of the city, with its precincts, and three villages on the right bank of the Rhine; the remainder forms the half-canton of Basel-country. The canton of Basel borders on Alsace-Lorraine and Baden, and has an area of 177 sq. m.—but little larger than the county of Rutland. Lying on the northern slope of the Jura, it is a country of hills and valleys. The mountains attain an elevation of over 3400 feet. The chief rivers of Basel are the Rhine and its tributaries, the Birz and Ergloz. The soil is fertile and well cultivated. The climate, except in elevated situations, is very mild. The inhabitants are chiefly employed in agriculture, the cultivation of fruit-trees and of the vine, cattle-husbandry, fishing, salt-works, the spinning of waste silk, the manufacture of silk ribbons, chemicals, colours and dyes.

The city of Basel arose out of a Roman fortified post, known as *Basilia* after an imperial visit in 374. From an early period it was the seat of a bishop, and in the beginning of the 10th century the Emperor Henry I. rebuilt the town, which then became a place of importance, and after 1032 formed part of the German empire. The centuries that follow are marked by a steady extension of the authority of the burghers, whose repeated efforts to break the power of the bishop and the nobles fill up the history of the period. Involved in many feuds with the House of Hapsburg, Basel formally joined the Swiss Confederacy in 1501. From 1519 onwards, Luther's writings were printed here; and at the end of twenty years from that time, the reformed doctrine had become generally prevalent. After the union with Switzerland, the triumph of the burgher party became also more complete; but the peace of the city was often disturbed by strife caused by the assertion of undue authority by the magistrates. All parties in the city, however, combined against the country district; and persons

belonging to the city were appointed to all offices, civil and ecclesiastical. Under the impulse communicated by the French Revolution, equality of rights was conceded in 1798; but in 1814 the new constitution made the city again supreme. After unsuccessful attempts to obtain redress of grievances by petition, civil war broke out in 1831, which did not cease till the troops of the Swiss Confederation took possession of the canton, and the diet recognised the separation of the city and the country district in 1833. The constitutions of the two half-cantons are in most respects similar, and are framed on the basis of the old constitution, modified in accordance with the principle of universal suffrage. In 1920 the half-canton of Basel-city contained 140,112 inhabitants, and Basel-country 82,033—in both cases more than two-thirds being Protestants. The capital of Basel-country is Liestal. Both Roman Catholic and Protestant clergy are paid by the state, and the parishes of the Reformed Church choose their own pastors.

The city of Basel was relatively much more important in the middle ages than now, and this though its population has grown from 29,555 in 1850 to 135,000 in 1920, and though in proportion to its population it is one of the wealthiest cities of Europe. In the 14th century, the number of its inhabitants was greatly reduced by the plague, or 'Black Death' (q.v.), which raged in it with terrible severity, and is sometimes mentioned as the 'death of Basel.' The town is well built and clean, but its appearance does not proclaim it the wealthiest city in Switzerland, as it is. The Rhine, here spanned by three bridges, 200 yards long, divides the city into two parts—Great Basel on the south side, and Little Basel on the north. The minster, a cathedral till 1528, was founded by the Emperor Henry II. in 1010, but not completed till 1500. It was restored in 1852–56, and has two conspicuous towers, 218 feet high. Other buildings are the town-hall (1508); the university, founded in 1460; a museum, in which there are thirty-two pictures by the younger Holbein, who lived thirteen years in Basel, though a native he was not; and a public university library of 160,000 volumes and 4000 manuscripts. During the Reformation, the university was a central point of spiritual life, and it has numbered among its professors men of great eminence in learning and science, including Erasmus and Œcolampadius, both of whom died here, and the mathematicians Euler and Bernouilli, who were natives of Basel. It has now some 100 professors and lecturers, and about 1000 students.—At Basel was concluded on 5th April and 22d July 1795 a treaty between the French Republic, Prussia, and Spain, Prussia withdrawing from the coalition against France.

Basel, Council of (1431–43), the last of the three great reforming councils of the 15th century, was summoned by Pope Martin V., and opened under his successor Eugenius IV., 23d July 1431. Its first session was held at Basel on 14th December 1431. Instead of the method followed at Constance, where the members deliberated and voted by nations, the council was divided into four departments, each with its own organisation, and each investigating a special class of subjects, its decision and reasons being communicated to the others. If three agreed in their opinions, the matter was brought before the whole council for final discussion and judgment. In this way the influence and intrigues of the Italian bishops were neutralised. The council addressed itself to the reconciliation of the Hussites, and to the reform of abuses in the church itself. But the first attempt to conciliate the Hussites was met with resistance by the pope, who not only refused his sanction, but empowered the cardinal legate to dissolve the council. The council strongly repelled the pope's pretension of right to dissolve it, and proceeded with its business. His injunctions that it should remove to Italy were equally disregarded. It renewed the decree of the Council of Constance, asserting the right of a General Council to exercise authority over the pope himself, and on his persevering to issue bulls for its dissolution, caused a formal process to be commenced against him, and cited him to appear at its bar. It assumed the papal powers, and exercised them in France and Germany, where its authority was acknowledged. It concluded a peace, in name of the church, with the Calixtines, the most powerful section of the Hussites, by the Prague Compact of 20th November 1433, granting them the use of the cup in the Lord's Supper. At length, Eugenius IV., being hard pressed by insurrections in the States of the Church, and afraid of losing his whole influence in France and Germany, solemnly ratified all its decrees, by a bull dated 15th December 1433. Desirous, however, of limiting the papal prerogatives, the council restricted the power of granting interdicts, abolished *annats* and other grievous exactions, and prohibited the bestowal of reversions to ecclesiastical offices. It also appointed punishments for certain immoralities in the clergy, and prohibited Festivals of Fools, and all the indecorous proceedings which had been commonly practised in churches at Christmas; and it adopted decrees concerning the election of popes, and for the regulation of the College of Cardinals.

At this time, a prospect was opened up of the union of the distressed Greeks with the Church of Rome, and a council was proposed to this end. The Basel fathers refused to meet in Ferrara, and having again cited the pope to its bar, not only, on his failing to appear, declared him contumacious, but on his opening an opposition council at Ferrara, went so far as, on January 24, 1438, to decree his suspension from the functions of his office. His party, however, was so strong that this decree could not be carried into effect; and the cardinal legate, with the greater number of the Italians, left Basel, and went over to his side. All the more resolutely did Cardinal Louis Allemand, Archbishop of Arles, a man of high courage and eloquence, now guide the proceedings of the council, which on May 16, 1439, declared the pope a heretic, for his obstinate disobedience to its decrees; and in the following session, formally deposed him for simony, perjury, and other offences. On November 5, 1439, it elected Duke Amadeus of Savoy to be pope, who styled himself Felix V., but was recognised only by a few princes, cities, and universities. France and Germany accepted the reforming decrees of the council, but remained neutral in the question regarding the popedom. The friendship of the Emperor Frederick III. strengthened the party of Eugenius; and the council gradually melted away, and its members, after three years of inactivity, held its last session at Basel on May 16, 1443, and removed its seat to Lausanne. Here a few prelates still remained together under the presidency of Cardinal Allemand, till in 1449, after the death of Eugenius, and the resignation of the antipope Felix, a compromise was effected, by which the fathers directed the church to obey the new pope, Nicholas V., who in return confirmed the acts of the council. Thus ended the last attempt to reform the church from within, and on its old basis. The Basel reforming decrees are contained in no Roman Catholic collection, and are held to be invalid by the canonists of Rome; yet they are of authority in canon law in France and Germany, although their application has been modified by recent concordats. See vol. vii. of Hefele's *Konziliengeschichte* (Freiburg, 1869).

Base-line. See ORDNANCE SURVEY.

Basella, a tropical genus of Chenopodiaceæ (q.v.). *B. alba* and *B. rubra* are known in Britain as stove biennials. They are plants with twining stems, in common use as pot-herbs in the East Indies, and cultivated in China; also sometimes in France as a substitute for spinach. *B. rubra* yields a rich purple dye. The great fleshy root of *B. tuberosa*, a South American twiner, is edible.

Base of Operations, in warfare, is the place, or the sum of the places, from which an army in the field obtains, or can obtain, its necessary supplies of all kinds, and its reinforcements. It is common to talk of ultimate base, intermediate base, advanced base, temporary base; these adjectives explain themselves. In a British campaign abroad, we have our islands as ultimate base. This, and the communications to it, being unassailable by the enemy as long as we have command of the sea, affords us the valuable advantage of fighting 'with limited liability.' A broad base is of very great value, as its possession affords a commander a wide freedom for his strategical movements. A narrow base, with a single route leading from it, seriously hampers strategical freedom, for the commander is compelled to cover continuously the single route. Its loss would paralyse the army. A force operating temporarily without a base—that is, carrying all its requirements with it—is called a flying column.

Bashahr, one of the Punjab Hill-states, on the lower slopes of the Himalayas, traversed from east to west by the Sutlej; area, 3820 sq. m. The raja and upper classes in the southern parts are Rajputs, and the people generally are of Hindu race, but their observance of Hinduism is very partial. The raja pays tribute to the British government, for which he is required to raise troops in time of war, and by which his sentences of death must be confirmed. Pop. 100,000.

Ba'shan, a country of south-west Syria, east of the Jordan, is a volcanic plateau rising in the Jebel-ed-Druz to 6000 feet, extends 60 miles north and south, and about 40 miles east and west. Josephus mentions four provinces: Gaulonitis, a western division, the territory of Golan, the ancient Hebrew city of refuge; Trachonitis (ancient Argob), to the north-east, the remarkable volcanic region of the Lejâh; Auranitis, comprising the fertile Haurân plain; and Batanea, to the east, the seat of the Druses (q.v.). In the time of Abraham, Bashan was occupied by the Rephaim ('giants'). Ashteroth-Karnaim, identified with Busrâh; Edrei, identified with Derât; and Kenath, with Kunawât, were its chief cities; the first two being the residence of its kings during the Amoritish dynasty. The last of its Amorite rulers was Og, who with all his sons was killed by the Israelites under Moses, at the battle of Edrei, when the half-tribe of Manasseh settled in the land. The men of Bashan were remarkable for their stature, its soil and pastures for their richness, and its sheep and oxen for their size and fatness. Bashan is covered with the ruins of the so-called 'giant cities,' which, however, according to Conder, date only from the early Christian centuries; their roofs, doors, stairs, and windows are of stone, some of them as perfect as when first built. Bashan belonged to the tetrarchy of Philip, and afterwards to that of Agrippa II. See works by Porter, Conder, De Vogüé, and Wright.

Bashaw. See PASHA.

Bashi, or BATANES ISLANDS, are politically a dependency of the Philippine Islands (q.v.), physically a link in the vast archipelago extending from Formosa to Sumatra. There are three larger and many smaller islets. Area, 127 sq. m.; pop. 10,000.

Bashi-bazouks', a name once given to irregular troops in the pay of the sultan. They were brave, but wild and turbulent infantry or cavalry.

Bashkirs, a Turko-Tatar people of Perm, Orenburg, Viatka, and Ufa. Sunnite Mohammedans and partly nomadic, they number three-quarters of a million. A Tatar-Bashkir republic (Samara, Orenburg, and Ufa) was formed after the Russian revolution, and a Bashkir republic (parts of Orenburg and Ufa; capital, Sterlitamak) was set up by the Moscow government in 1919–20.

Bashkirtseff, MARIE, artist and diarist, was born of noble family at Poltava in the Ukraine, 11th November 1860, and died of consumption, on the 31st October 1884, at Paris, where she had become famous as a brilliant member of society, a woman of marvellous accomplishments, and a painter of very high promise. Her *Journal* (trans. from the French by Miss Blind, 1890) is a startling, sincere, vivid, and pathetic record of a life in which strenuous labour was but an element in a whirl of the keenest joys and griefs, the triumphs and disappointments of a nature singularly impressionable and sensitive, as well as vain and ambitious. Her *Letters* (Eng. trans. by Miss Serrano, 1891) have also been published, and a *Nouveau Journal inédit* (1901).

Basic Slag, Basic Steel. See IRON AND STEEL, SLAGS, MANURE.

Basil, surnamed THE GREAT, and called St Basil, one of the most eminent and eloquent of the Greek Fathers, was born about 329 at Cæsarea, in Cappadocia; studied under the heathen philosophers at Athens, where he began a lifelong friendship with Gregory Nazianzen, his later letters to whom are full of information about contemporary times; became an advocate in his native city, but afterwards founded a monastic society; was ordained a presbyter in 364; and succeeded Eusebius as Bishop of Cæsarea in 370, in which office he continued till his death in 379. He resolutely resisted invitations to the court of Julian the Apostate, with whom he had contracted an intimacy as a fellow-student at Athens, and displayed great constancy when the Emperor Valens began to persecute him on account of his opposition to Arianism. He was engaged in most of the controversies of his time, but conducted controversy in a gentle and generous manner. His rules of monastic life are still followed in the Greek and other oriental churches, in which he is highly honoured as one of the greatest of saints. In the Roman Catholic Church, also, they are followed in a few convents, styled of the order of *Basilians*. He is also the author of a revised liturgy, still in use in the East, known as the *Liturgy of the Holy Basil;* but his chief services to the church were in defence of the Nicene creed against the Arians. The best editions of his works are those of the Benedictines (3 vols. Par. 1739), and that of Migne in 4 vols. (29–32) of his *Patrologia Græco-Latina* (Par. 1866); but the authenticity of many of his moral and ascetic pieces is doubtful. His anniversary is celebrated, in the Greek Church, on the 1st of January—the day of his death; in the Latin Church, on the 14th of June—the day of his ordination. See a book by E. F. Morison (1912).

Basil I., 'the Macedonian,' Byzantine emperor 867–886, came to Constantinople when still a young man, and was in 861 appointed chamberlain to the Emperor Michael III. After the assassination of this monarch in 867, Basil became sole emperor of the East. His first care was to heal the wounds of the state; and, as the prodigality of Michael had exhausted the public treasury, he took means to refill it by a wise economy. His valour made

him the terror of the Saracens, from whom he reconquered Asia Minor. He sent missionaries to the Russians of Kiev, who, from that time, began to embrace Christianity and acknowledge the authority of the Greek Church. He died in 886. Basil founded a pure despotism, and, as part of a system of centralisation, placed eunuchs at the head of the departments of state, who, as they could not found a dynasty, would be less tempted to rebellion. He also introduced the principle of legitimacy in succession, and initiated the custom of having his descendants born in the 'porphyry chamber,' so that the title Porphyrogenitus might be equivalent to Prince Royal. He left his dynasty so secure that it reigned in greater or less prosperity for 200 years.

Bas'il (*O'cymum*), a mainly tropical or subtropical genus of Labiatæ (q.v.), characterised by a pleasant aromatic smell and taste, and reckoned among *sweet herbs*.—SWEET BASIL (*O. basilicum*) is an Indian annual which has long been cultivated in Europe for seasoning purposes. It was formerly also of some medicinal repute, and is doubtless a gentle carminative. Many superstitions attach to it. The ancients asserted that the plant had the power of propagating scorpions, even in the brains of men. The belief that it thrives especially on the brains of murdered men occurs in the *Decameron*, and is rendered familiar by Holman Hunt's picture. —BUSH BASIL (*O. minimum*) is of similar origin and uses. The seed of both species should be sown on a hotbed, and subsequently planted out.—WILD BASIL and BASIL THYME are species of Calamint (q.v.).—Basil Vinegar is made like Mint Vinegar, by steeping the leaves in vinegar. Basil is said to be protective against mosquitoes and malaria.

Basil'ica (Gr. *basilikē*, from *basileus*, 'king'), a market-place, exchange, and place of meeting. According to Sir A. Evans, the royal villa to the NE. of Knossos was the prototype of the house of the Athenian archon basileus, and thereby of the basilica. The first basilica we hear of at Rome is the Basilica Porcia in 182 B.C. Till the time of Constantine, they were constructed in great numbers. Some twenty are known to have existed in Rome, and latterly every provincial town, even those of small extent, had each its basilica, as that of

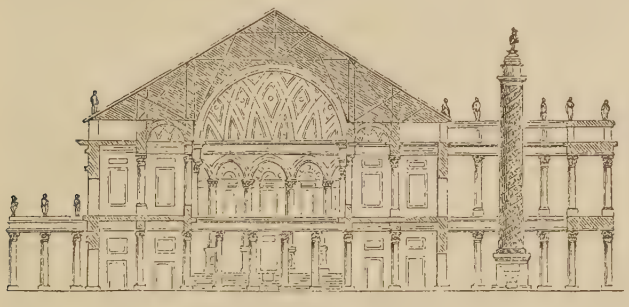


Fig. 1.—Section of Trajan's Basilica, Rome.

Pompeii, which is now the most perfect example, still testifies. The earliest basilicas were entirely open to the external air, and were surrounded with a portico under which shelter could be obtained; but in course of time the central space was also covered in. The basilica then became an oblong hall, divided by rows of columns into a wide central nave and lower side aisles, over which there was frequently a gallery. The central space was lighted by windows in the upper part of its side walls (like the clerestory of a church). Amongst its other uses, the basilica contained an apse, in which the prætor conducted his court of justice. It has generally been supposed that the prætor's apse and seat were at one end of the central division, immediately opposite the entrance at the other, but this is now disputed (see APSE). The form of the basilica was not always

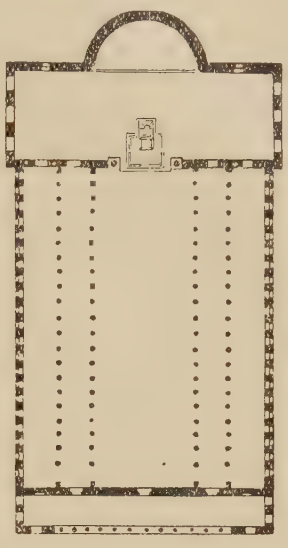


Fig. 2.—Ground-plan of Basilica of St Paul, Rome.

the same. Sometimes there was no hemicycle or apse, as in the basilica at Pompeii, in which case the tribunal was cut off from the nave; sometimes there were two, as in the basilica of Trajan. Again, the basilica was sometimes entered, not from the end, but from the sides, where the transepts of a modern church are situated; and at the end opposite that in which the tribunal was placed there was often a row of small chambers, the uses of which do not seem to be very accurately ascertained, and probably were not invariable. In the plan of the basilica of Pompeii there was an outside stair which led to the upper gallery, which in this case passed entirely round the building. The gallery was the place to which loiterers usually resorted for the purpose of watching the business proceedings below; and the one half of it is said to have been devoted to men, the other to women. The large churches of the Christians, erected after the religion was adopted in the empire, had a considerable general resemblance to the Roman basilica, and those churches have always gone by the name of basilicas. But Professor Baldwin Brown disputes this, and maintains that the early church was rather an enlarged schola (or guild-hall) than a basilica. Probably the professor's view is right as regards the churches of the first three centuries, but when thereafter the congregations largely increased, the churches were enlarged after the idea of the basilica.

Fig. 2 shows the usual plan of these Christian basilicas—a large oblong space, divided into central nave and side aisles by two or four rows of columns, preceded at the entrance end by a porch or narthex (to which alone the neophytes and penitents were admitted), and terminated at the opposite end with a cross wall, containing in the centre a great triumphal arch which led into the

transept or sanctuary reserved for the clergy, out of which opened the apse, with the bishop's throne in the centre, raised some steps above the floor, and the seats of the presbyters and deacons on each side. Between the bishop and the people stood the altar, generally raised over the crypt which contained the body of the saint to whom the building was dedicated. The narthex was usually preceded by an open court with colonnade and fountain. Attached to this was the Baptistery (q.v.).

A large number of basilicas still exist in Rome, dating from the 5th and 6th centuries up to the 10th. Churches in France and England were sometimes honoured by the pope's permission to assume the title of basilica.

Basilica, a code of laws of the Byzantine empire, the compilation of which was begun in the reign of the Emperor Basil I., the Macedonian, completed by his son Leo, the Philosopher, and first published in 60 books in 887. Constantine Porphyrogenitus, the son of Leo, prepared an official commentary to it, as well as a revised edition of the work itself. It was very much an adaptation of the code of Justinian to altered circumstances, and is of great value for the interpretation of the *Corpus Juris*. Apparently the code was at first called *The Revision of the Ancient Laws*, next *Hexēkontabiblos*, from its division into sixty books; and finally, before the end of the tenth century, it came to be called by its present name—apparently an elliptical form of *basilika nomima* ('imperial constitutions'). Some have supposed, however, that the name was derived from that of the Emperor Basil, as those legal forms instituted by his son were originally initiated by him. There are editions by Fabrot (7 vols. fol. Paris, 1647) and Heimbach (6 vols. Leip. 1833–70; with supplements by Zachariä, Ferrini, and Mercati, 1846–97).

Basilicata, one of the 'compartimenti' of the kingdom of Italy, touching the Gulf of Taranto. It exactly corresponds with the official 'province' of Potenza (q.v.), the province being the administrative unit, the compartimento usually a conventional grouping of several provinces.

Basilicon (Gr., 'royal,' or 'of great virtue'), a name given to four kinds of ointment, all of which contain the substances yellow wax, resin, and olive oil, along with other ingredients. Basilicon proper differs from *Yellow Basilicon* in containing suet and turpentine in addition to the above ingredients, while Burgundy pitch is also used in the preparation of the yellow ointment. *Black Basilicon*, or *Unguentum Tetrapharmacum* (*tettara pharmaka*, 'four drugs'), derives its name from containing one-fifth of black pitch along with the three drugs above mentioned. *Green Basilicon* contained verdigris, but has quite fallen into disuse. The resin, wax, and other ingredients of basilicon are melted together over a slow fire; the oil is then added, and the mixture, while hot, strained through linen. The straining is directed in consequence of the impurities which resin often contains. Basilicon ointment, or resin cerate, as it is usually called, is much used as a gentle stimulant application to blistered surfaces, indolent ulcers, burns, scalds, and chilblains.

Basilicon Doron (Gr., 'royal gift') is the name of a work written in 1599 by James I. of England (then James VI. of Scotland) for his eldest son, Prince Henry. It expounds James's views as to the divine right of kings.

Basili'des, one of the greatest of the Gnostics, who flourished at Alexandria about the year 125 A.D. Many of his fantastic speculations bear greater resemblance to the doctrines of Zoroaster, and in some points to Indian philosophy, than to the religion of Jesus. The first principle of all things is the unborn and unknown Father, from whom emanated in succession *nous* ('mind'), *logos* ('the word'), *phronēsis* ('understanding'), *sophia* ('wisdom'), and *dynamis* ('power'). From the last sprung *dikaiosynē* ('justice') and *eirēnē* ('peace'), and these seven with the Father formed the first Ogdoad, or octave of existence which originated the first heaven. From them emanated other powers which created the second heaven, and so on through the whole circle of emanations, which amount to 365, the mystic number so often inscribed on the symbolic stones in the Gnostic schools (see ABRAXAS STONES). Each of these angelic powers governs a world. There are, consequently, 365 worlds, to each of which Basilides gave a name. The *archōn* or head of the 365th, or lowest world, rules the material universe, which he also created. He is the God or Jehovah of the Old Testament, and when the earth was divided among the rulers of the material universe, the Jewish nation fell to the share of himself, who was the prince of the lowest class of angels. But wishing to absorb all power himself, he strove against the other angels, and to make them subject to his 'chosen people,' the result of which was war, strife, division in the world, together with the loss of the true religion, to restore which the Supreme God sent *Nous*, the first emanation who became incarnate in Jesus at his baptism. His disciples (Basilidians) were numerous in Egypt, Syria, Italy, and even in Gaul, where they continued to exist till the 4th century. Such mainly is the account of the teaching of Basilides given by Irenæus, and accepted by all until the discovery of the *Philosophoumena* of Hippolytus in 1842. According to this, Basilides started with a God unknown and unknowable by human faculties, rather than with a dualism of God and matter or evil, or with a theory of emanation. This non-existent God by his volition created the *pansperma*, or seed, the germ of all things, containing within itself three degrees of divine sonship: one pure, the second gross, the third requiring purification. The great *archōn*, sometimes called Abraxas, next sprung from the *pansperma*, ascended into the firmament, and produced a son greater than himself, by whose help he framed the world. Their rule—the Ogdoad—extends through all the etherial region down to the moon's sphere, where the grosser air begins—the Hebdomad, ruled by an inferior *archōn*, the God of the Jews. The process of enlightenment is thus: first, the mind of the son of the great *archōn* is illuminated; next, the light passes to the son of the *archōn* f the Hebdomad, then to Jesus, who instructs such of mankind as are capable of truth. Their souls go upwards; their bodies return to the primeval chaos. The three progressive periods of human enlightenment are thus the Ante-Jewish, the Jewish, and the Christian. Of all the Gnostic systems, that of Basilides came nearest the dualism of Persia; and latterly it had degraded into actual magic, though it is doubtful how far Basilides was himself responsible. Clemens Alexandrinus charged him with deifying the Devil—thus representing or misrepresenting his dualism. See GNOSTICISM, and books there cited; also 'Basilides' in Hauck-Herzog.

Basiliscus, brother-in-law of Leo I., shared in the defeat of Heraclius by Genseric (q.v.). After Leo's death he seized the Byzantine throne (475), but, his followers falling away, was taken by Zeno, and died in Cappadocia (477).

Basilisk (*Basiliscus*), a genus of Central American lizards, in the family Iguanidæ, remarkable for the erectile crests which the males bear on the back and tail, and sometimes on the head also. A common species, *B. americanus*, may grow to almost

a yard in length; it is predominantly green and brown; it frequents the banks of the rivers in Mexico and Guatemala, and is equally at home on

Basilisk (*Basiliscus mitratus*).

the trees and in the water beneath. The diet is exclusively vegetarian, and the tender flesh of some species is much appreciated. The animals are lively and quite harmless, only in their form suggesting the mythical basilisk. See IGUANA, LIZARD.

The fabulous BASILISK (Gr. *basiliskos*, diminutive of *basileus*, 'a king,' so named, according to

The Mythical Basilisk.

Pliny, from the spot on the head like a crown) was by ancient and medieval authors believed to be hatched by a serpent from an egg laid by a cock. It inhabited the deserts of Africa, and, indeed, could inhabit only a desert, for its breath burned up all vegetation; the flesh fell from the bones of any animal with which it came in contact, and its very look was fatal to life; but brave men could venture into cautious contest with it by the use of a mirror, which reflected back its deadly glance upon itself. Trevisa calls it the 'king of serpents that with smile and sight slayeth beasts.' It is described as about a foot long, with a black and yellow skin, and fiery red eyes; and its blood was supposed to be of great value to magicians. The weasel alone could contend with it, curing and reinvigorating itself during the combat by eating rue. The crowing of the cock was also obnoxious to the basilisk.

The word *basilisk* and its equivalent *regulus* are sometimes used in the Vulgate. The authorised English version of the Old Testament sometimes reads *adder*, and sometimes *cockatrice* (as in Isaiah xi. 8). The revised version reads *basilisk*.

The name was anciently applied to a large cannon, usually of brass, throwing a shot of about 200 lb. weight.

Basim, or BASSIM, a town of India, in Berar, 413 miles E. by N. of Bombay; pop. 9000. The former district of Basim was divided in 1905 between Akola and Yeotmal. The town is in Akola.

Basin, in Geology, is a term applied to depressions in the strata, in which beds of a later age have been deposited. Thus, the London basin, consisting of tertiary sands and clays, occupies a hollow in the chalk, which is bounded by the North Downs on the south, and by the chalk-hills of Berks, Wilts, Bucks, and Herts on the north. The term has also been applied to synclinal depressions of strata, as the coal-basin of South Wales. Such synclinal basins do not necessarily give rise to any corresponding depression at the surface of the ground. See ANTICLINE.

Basin of a river, in Geography, is the whole tract of country drained by that river. The line or boundary which separates one river-basin from another is called the watershed. By tracing these watersheds, the whole of a country or continent may be divided into a number of distinct basins; the basin of a lake or sea being made up of the basins of all the rivers that flow into it.

Basingstoke, a town in the north of Hampshire, 48 miles WSW. of London. It is a place of much activity, being situated at the junction of five main roads to London from the south and west of England, and it is also an important railway centre. Its chief buildings are the fine Perpendicular parish church, the town-hall (1832), and the corn exchange (1865); and it has iron-foundries, clothing-factories, and breweries. Basing House, 1½ miles eastward, belonging to the Marquis of Winchester, for two years withstood the forces of the Commonwealth; but Cromwell at last took it by storm, and burned it to the ground, in 1645. The remains consist of the gate-house and a few walls and mounds. Pop. (municipal borough), 13,000.

Baskerville, JOHN, a celebrated English printer and letter-founder, was born in 1706 at Sion Hill, Wolverley, Worcestershire. A footman to start with, he afterwards became a writing-master in Birmingham, and from 1740 carried on the business of japanning there with great success. About 1750 he began to make laborious and costly experiments in letter-founding, and succeeded in making types which have scarcely yet been excelled. The quarto *Virgil* printed by him at Birmingham (1756), in Macaulay's words 'was the first of those magnificent editions which went forth to astonish all the librarians of Europe,' and which, 55 in number, included Milton, Juvenal, Congreve, Addison, the Bible, a Greek New Testament, Horace, and Catullus. He died, bequeathing £12,000, 8th January 1775. A foe to all that he termed 'superstition,' he chose to be buried in his own garden, whence (to allow of building there) his remains were exhumed in 1826. See TYPES, and the Life by Straus and Dent (1907).

Basket, a vessel of wickerwork, made of willows, reeds, cane, straw, bast, or other materials, interwoven. The origin of the word is very obscure. It has been conjecturally allied with Lat. *bascauda*, used by Juvenal and Martial, and by the latter given as British; but at present there is no evidence to connect the words. It is found in English since the 13th century, but it does not occur in other Teutonic or in Romance tongues. In ancient Britain the shields of soldiers were formerly made of basket-work as well as their coracles or boats; the latter were made water-tight by being covered with the skins of animals. Similar boats are still used for crossing some of the rivers of India. Window-screens, chairs, pony-carriages, and screens are made of basket-work. Willows are largely grown in Holland, France, and Germany, though those most in request among basket-makers are grown in England in the valleys of the Thames and Trent. In several parts of England and Scotland, great attention is now paid to the cultivation of the willow; and judging from the statements of some of the cultivators, the returns yielded are very satisfactory (see OSIER, WILLOW). The tools required being few and inexpensive, a large number of poor persons are engaged in the manufacture of baskets, that are hawked about the streets by their wives and children. But a large proportion of these are of French manufacture, as is also the case with the

fancy baskets sold by blind asylums.—Basket-ball is a game in which each of two teams of players tries to bat with the hand a ball or inflated bladder into the basket—a net suspended at a height of 10 feet—of the other side. For Basket-fish, see BRITTLE-STARS.

Basle. See BASEL.

Basnage, JAQUES, the son of an able advocate in the parliament of Normandy, was born in 1653 at Rouen, where he became pastor of the Reformed church. On the revocation of the Edict of Nantes (1685) he retired to Holland, and finally settled as minister of the Walloon church in The Hague, having gained the friendship of the Grand Pensionary Heinsius. Here he was called upon to take an active part in negotiating the defensive alliance concluded by France, England, and the States-general in 1717. He was also famous as a writer of church history, especially of the Reformed church (in reply to Bossuet) and of the Jews. He died 22d September 1723.

Basoche. See BAZOCHE.

Basque Roads, or AIX ROADS, off the coast of Charente Inférieure, separated from the Bay of Biscay by the islands of Ré and Oléron, are sometimes named from the small island of Aix there. They were, in 1809, the scene of a naval battle, in which Lord Cochrane (see DUNDONALD) distinguished himself more than Lord Gambier (q.v.).

Basques (Spanish *Vascongados*), a curious people on both sides of the western Pyrenees, forming, despite its small numbers, one of the separate folk-stems of Europe. Whatever its ancient dimensions, its district is now limited to the Spanish provinces of Vizcaya (Biscay), Guipúzcoa, and Álava —the *Basque Provinces*—with northern Navarra; besides the French arrondissement of Mauléon and part of Bayonne, forming about a third of the department of Basses Pyrénées. The French part formed in ancient times three territorial divisions, *Le Labourd*, *La Basse-Navarre*, and *La Soule*, embracing the valleys of the Bidassoa, of the Nivelle, of the Nive, of the Bidouze, and of the Saison, an affluent of the Gave d'Oloron. The Basque country covers roughly an area of 3000 to 4000 sq. m., of which one-sixth is in France. The boundary on the French side is purely artificial. The orographic system is very complicated; it may be compared to an inextricable knot binding the great chain of the Pyrenees to the plateau of the Castiles. The whole country is a medley of valleys, gorges, *cols*, passes (or *ports*), heights, and plateaus. Its general aspect is smiling and gay. In the French provinces one sees indeed abrupt and bare hill-slopes, but side by side with these the plains are cultivated, the mountains covered with firs, beeches, oaks, and chestnuts, with here and there fields of wheat or maize. A large portion of the surface is still uncultivated; often the soil is clothed only with an abundant natural vegetation consisting of ferns, gorse, and heath, made use of to provide litter for the cattle which are kept indoors the greater part of the year. Here and there appears a smiling homestead, its door always open, round it almost always a kitchen-garden or an apple-orchard. Agriculture is in a backward state—the only plough in the Spanish provinces is still the *laya*, a clumsy two-pronged fork as old as the Roman epoch. From the point of view of cultivation, the surface may be divided into two distinct parts—the high mountains covered with rich forests, and the plains divided into fields of maize and wheat, vines, kitchen-gardens, with meadows here and there, as well as apple and chestnut orchards. Of all the crops, that of maize is the most important. The Spanish provinces produce wheat, cider, and those naturally heady and well-coloured Navarre wines, stored in great goat-skin bottles, that have at least a high local reputation. Maize-bread (*metture*), a poor quality of cider (*pittara*), a highly seasoned soup of vegetables (*eltzekarri*), and a dish of green cabbages (*garbure*) are in general use. The foundries excepted, the industries are insignificant, and are mostly worked by strangers rather than the native race. There is a constant stream of emigration, chiefly to South America; and it has been estimated that there are some 200,000 Basques in Argentina alone. Many have gone to Mexico and Cuba. Besides, young persons of both sexes, but more particularly girls, are constantly finding their way (as they have done for centuries) to the large towns in both France and Spain, of whom many marry and never return.

Anthropological research (see Collignon, *La Race Basque*; Keane, *Man Past and Present*) associates the Basques (not as of old with Finns and Esths, but) with the White Hamites of northern Africa, Egyptians, and Berbers. See the end of this article. The question is often asked, are the Basques ethnologically of a uniform type? It was long believed that they were all brachycephalic, but the researches of Dr Broca, Dr Velasco, Virchow, and Antoine d'Abbadie, both on exhumed skulls and on living subjects, have proved that among the Basques there are two distinct types: a *dolichocephalic*, with a mean cranial capacity larger than that of modern Parisians, and a *brachycephalic*, with a smaller cranial capacity. It is impossible to determine which of these two cranial forms is the characteristic type, and which is anterior to the other. The Basques, then, do not form a pure race, and accordingly we find great variation in height, form, and above all in the colour of the eyes and hair. The Basque, like most peasants of Southern France, is strongly imbued with prejudices, with ancient superstitions, which Catholicism has not been able to eradicate; he is devoted to his peculiar customs, soft and complacent in his manners, but irascible and formidable in his anger; ardent and enthusiastic, but habitually serious; proud and independent, and gifted with a high sense of his personal dignity. His morals are pure and simple; his religious convictions ardent and sincere—there are few families that do not count a priest among their members. His stubborn independence is shown by the tenacity of his assertion of his ancient rights, the *Fueros* ('privileges') (q.v.); and the noble loyalty of his nature by his reckless allegiance to lost causes, notably to that of the Carlists, grandfather and grandson, in 1833–37 and 1872–76, which cost the Basques the last of their ancient and distinctive privileges. The decree of 9th July 1876 destroyed the last remnant of ancient Basque nationality, by introducing the conscription and the same taxation as in the rest of Spain. Two hundred years ago most of the Basques were sailors; they fished the whale and the Newfoundland cod, and we are even told that theirs was the commercial language of Canada. They have produced a large number of great seamen. If we need not believe that they discovered America before Columbus, it is at least true that Sébastien d'Elcano, the lieutenant of Magellan, who actually circumnavigated the globe, was a countryman. To-day nine-tenths of the natives are devoted exclusively to agriculture. The few who devote themselves to liberal studies make indifferent mathematicians, but show much taste for purely literary studies, especially poetry and works of imagination. This race has produced some distinguished men of letters, as Alonzo d'Ercilla, Pío Baroja, and Unamuno, and lays claim to the paternity of one of the most remarkable institutions of modern times—Ignatius Loyola, the

founder of the order of Jesus, and Francis Xavier, the most devoted of its missionaries, were Basques.

The Basque still preserves part of his ancient and characteristic costume in the *béret* (*boina*), a blue or red cap, like the Scottish broad bonnet; the belt (*zinta*)—almost always red in France and blue in Navarra—and the short jacket thrown over his shoulder. His shoes are the hempen *espartinac* (Fr. *espadrilles*, Span. *alpargatas*). He wears no cravat, and is usually closely shaved; indeed the first care of the young Basque soldier on his discharge is to cut off the compulsory moustaches of the service. The old men usually wear the hair long. Young and old are armed with the *makhila*, a staff of medlar, loaded at its lower end, which can be hung to the wrist by a leather knot, and which, in the hands of an active fellow, is a formidable weapon. They are passionately fond of games, especially dancing and hand-ball (*pelote*); and there is no village without its *rebot*, where not only young but middle-aged men play in organised matches in presence of the whole village with marvellous vigour and agility. The only one of their distinctive dances that still survives is the grave *mutchiko*, the so-called 'Basque dance,' reserved for men alone. They sing much, their original songs being mostly in a minor key, the tone sad and sweet, the words expressing usually the sorrows of love. But the most remarkable of their distinctive institutions are the *Pastorales*, or Basque dramas, which now survive, however, only in La Soule, in the two French cantons of Tardets and Mauléon, where they are played every year, on the occasion of some great festival, spite of the opposition of the curés. Each *pastorale* is preceded by a long prologue, and terminated by a morality appropriate to the subject. The emphasis, the gestures, and the rhythm, are traditional as well as the costumes of the actors. The action is always very lively; the movements follow the rhythm of the singing, and in the scenes representing battles the combatants advance and recede regularly, while they repeat the first two and the last two verses of a quatrain, which Wentworth Webster compares to the strophe and antistrophe of a Greek tragedy. The good march calmly and majestically; the bad, with great steps and with horrible gestures; while the devils dance, leap, and run about continually. Usually the spectacle, which is preceded by a promenade of the whole troupe through the village, does not last less than seven or eight hours, yet the attention of the auditors is unbroken. Their impressions betray themselves by expressive interruptions; the death of a hero is usually accompanied by universal cries of 'Ai, ai!' and the discharge of pistol-shots. These *pastorales* are learned by word of mouth during the long evenings of winter. They are all in Basque, from 3500 to 6500 lines in length (*Warwick* has 7116 lines), most of them in verses of eight feet, divided equally into strophes of four verses, of which the second rhymes with the fourth, the two others not rhyming. The measure is often very defective, and the rhyme merely a defective assonance. They are not divided into acts. The strangest anachronisms occur, and events succeed each other without the least transition. In *Claudieus and Marsimissa* are found a Roman emperor, a king of France, a Duc de Richelieu, a Pope Julius, a King Nero, Cardinal Baronius, and the grand Turk Mustafa. Charlemagne is represented with blue spectacles, a blue dress, white cotton gloves, a *makhila*, two gold chains, and the cross of the Legion of Honour or a Crimean medal. All of them tend ingeniously to the honour of the Christian religion, and to the disgrace of Saracens and Mohammedanism. In all there figure pagan Turks, whom the devils aid, and whom the Christians always conquer or convert in the end. Many of them are mere survivals of the old medieval mysteries and moralities, even down to the very buffooneries, more or less gross, which distract the attention of the auditor. Webster discovered that the pastorales are all composed directly from the French chap-books hawked about the country, the originals having actually been shown him by their authors. Of course, indirectly through these they go back to the old *chansons de geste*.

Language and Literature. — The wonderful language of the Basques (by themselves called *Eskuara*, *Euskara*, *Uskara*, a word of uncertain origin, from which are formed the French adjective *Euscarien*, and the national name of the Basques, *Eskualdunak* or *Euskaldunak*, 'those who have the Euskara') stands as yet absolutely isolated from all the tongues of Europe, and furnishes perhaps the only example of a consistently incorporating language. It belongs to the agglutinative division of languages, joining on the varying to the permanent element of the word, and post-fixing for the most part the sounds which express the relations of grammar. It shows in some of its compounds a strange but merely casual analogy with the polysynthetic languages of America, and must be placed morphologically between the Finnic family, which is simply incorporating, and the North American incorporating and polysynthetic languages. Of course, this statement is quite a different thing from a conclusion that Basque has any relation other than a singular analogy either with the Finnic or Magyar on the one side, or the Algonquin or Irokese on the other. Basque employs the Roman character. Prince Louis-Lucien Bonaparte counts 13 simple vowels and 38 consonants, and to these 51 phonetic elements we must add 6 diphthong-vowels and the aspirated consonants. The doubling of consonants is not permitted, and in actual speech many soft consonants are dropped. The letter *r* cannot begin a word. The cases are formed by post-positions, which may be added one to the other, and in the modern dialects the singular is distinguished from the plural only in the definite declension, where the post-fixed article is *a* in the singular and *ak* in the plural; as *gizona*, 'the man,' *gizonak*, 'the men;' *emakumea*, 'the woman,' *emakumeak*, 'the women.' Some of the common suffixes are *k*, the mark of the plural and of the agent; *n*, 'in;' *i*, 'to;' *z*, 'by;' *ik*, 'some;' *ko*, *go*, *dik*, *tik*, 'of;' *kotzat*, *tzat*, *tzako*, *kiko*, 'for;' *kin*, *kaz*, *gaz*, 'with;' *gatik*, 'for;' *gan*, *baithan*, 'in;' *gandik*, 'from;' *ra*, *rako*, *ronz*, 'towards;' *gana*, 'to,' 'at,' &c. Of these suffixes some are joined to the definite, others to the indefinite noun, or to both. The personal pronouns are *ni*, 'I;' *gu*, 'we;' *hi*, 'thou;' *zu*, 'you.' There are still four demonstrative pronouns: *a*, *hura*, *hau*, *hori*, but traces of others now lost are seen in the flexions of the verb; *d*, as a third person, subject and object; *t*, as a first person, subject; as *dakust*, 'it see I,' from *d-ikus-t*; *doa*, 'he goes,' from *d-oa*. The pronoun 'self' is rendered by *buru*, 'head.' The relative pronoun is rendered by the suffix *n* agglutinated to the verbal flexion; its oblique cases by the interrogative pronoun *zein*. Basque has no genders, but it uses verbal forms of address, in which the sex of the person addressed is indicated by a special suffix, thus: 'I do not know him,' spoken to a woman, is *eztakinat;* to a man, *eztakiat* (for *eztakikat*). The grammar would be simple but for the verb, which in conjugation is exceedingly complicated.

In its present state Basque rarely employs its regular verbal inflections, and has practically but two verbs, 'to be' and 'to have,' all other verbs

being generally used as participles expressed in a periphrasis. This system consists in combining a verbal noun with an auxiliary verb, and for 'I see it,' saying 'I have it in seeing.' The number of forms possessed by the verbal noun and auxiliary verb is almost endless; not only is there a different form for each of the personal pronouns, whether in the objective or the dative case, but there are also different forms for addressing a woman, an equal, a superior, or an inferior. The verbal adjective is the form given in the dictionary, and corresponds to a past participle, as *ikusi*, 'seen;' followed by the suffix *ko* or *n*, it forms a future and a conditional, as *ikusiko dut*, or *ikusiren dut*, 'I shall see it;' the verbal substantive is merely a locative, as *ikusten*, 'in the sight,' 'in seeing.' The present tense forms of 'to have' are: for the singular, *daut, dauk, dau;* and for the plural, *daugu, dauzu, daue;* or, more generally, *dut, duk, du, dugu, duzn, dute.* The imperfect tense forms are: singular, *neban, eban, eban;* plural, *genduan, zenduan, ebeen;* or, more generally, *nuen, huen, zuen, ginduen, zinduen, zuten.* The present optative forms are: singular, *duket, dukek, duke;* plural, *dukegu, dukezu, dukete;* and imperfect: singular, *nuke, huke, luke;* plural, *ginuke, zinuke, lukete.* Such is the complete verb; its compound tenses are irregularly made up with the auxiliary *izan*, 'to be;' thus, 'I have had,' *izan dut;* 'I had had,' *izan nuen.* The transitive verbs are thus compounded after the periphrastic method—e.g. from the verbal adjective *ikusi*, 'seen;' 'I see it,' *ikusten dut;* 'I saw it,' *ikusten nuen;* 'I have seen it,' *ikusi dut;* 'I shall see it,' *ikusiren dut;* 'I should have seen it,' *ikusi izanen nuen;* 'that I may see it,' *ikusi dezadan;* 'I can see it,' *ikusi dezaket;* 'I could see it,' *ikusi nezake.* The only irregular verb is *izan*, 'to be.' Its present indicative is: singular, *naiz, aiz, da;* plural, *gara, zara, dirade.* The modern periphrastic conjugation, according to Prince Louis-Lucien Bonaparte, has developed in all its dialects eleven moods and ninety-one tenses (each of which has three persons in each number), variable according to the sex or rank of the person addressed; it receives besides a certain number of terminations, which perform the office of our conjunctions. The syntax of Basque, as of all agglutinative languages, is simple. The phrases are short. Composition is so common that it has caused several juxtaposed words to be contracted and reduced, so as to be partially confounded one with the other. This is the phenomenon known as *polysynthetism*, seen in the dialects of America, in which the words that make up a sentence are stripped of their grammatical terminations, and then fused into a single word of cumbrous length. Many words are simply formed thus: *odotsa*, 'thunder,' is made up of *odei*, 'cloud,' and *otsa*, 'noise;' and *illabete*, 'month,' seems to be a compound of *illargi-bete*, 'full moon;' *illargi*, 'moon,' itself being composed of *il* or *hil*, 'death,' and *argi*, 'light.' The vocabulary is poor.

The study of the language is rendered the more difficult by the extreme variability of its dialects. There are perhaps no two villages where it is spoken entirely alike. Prince Louis-Lucien Bonaparte recognises no less than twenty-five dialects, which, however, fall easily into eight great dialects, which again may be reduced to three, Eastern, Western, and Central. Whether or no it was spoken in Paradise, Basque at least baffled the Devil to acquire. After seven years' diligent study in the Labourd country, he had only two words, *bai*, 'yes,' and *ez*, 'no,' and even these fled from his memory as he crossed the Pont Saint Esprit of Bayonne.

The history of Basque is very short, and the few early allusions to it are meagre and uncertain. Beyond the eighteen words of Aimeric Picard's manuscript, discovered in 1881, and the few mentioned *en passant* by Lucio Marineo Siculo in his *Cosas illustres y excellentes de España* (1539), we have scarce anything until the discourse of Panurge in chap. ix. of the second book of *Pantagruel.* This incomprehensible passage is not found in any edition anterior to Dolet's (1541). The oldest printed book in Basque is a collection of poems, half devout, half amorous, the work of Dechepare (1545), a curé of Lower Navarra. By far the most important is the New Testament, translated by Liçarrague, and printed at La Rochelle in 1571 by order of Jeanne d'Albret. Axular's *Gueroco Guero* (1643) is perhaps the most readable.

Basque literature consists mostly of devout translations from French, Spanish, and Latin. Much more interesting than these is the oral literature of the country, though here there is little that is original and spontaneous, even in the songs, children's rounds, riddles, formulas for games, proverbs, and stories. The *pastorales*, already spoken of, come first in interest. This primitive people preserves its legends with striking tenacity. Its stories, still told by the peasants in the long winter nights, at their prolonged wedding or other feasts, or at the gatherings from time to time to strip the husks from the ears of maize, are still literally believed in, however much they may seem to contradict modern notions of everyday life. They are *lege zaharreko istorriuak*, 'histories of the ancient law.'

History.—The early history of the Basque race is as yet entirely uncertain, but so far it appears that at no time in history was there any Basque nationality properly so called, nor can we go back with any kind of historical certainty to a time when they were more than a small tribe of rudimentary civilisation, located more or less widely in the valleys of the Western Pyrenees. The medieval historians speak of a mountain population, variously named *Cantabres, Vascons*, &c., but are unanimous only in the unflattering terms in which they describe them. The pilgrims who crossed the Pyrenees eight or nine centuries ago feared to meet them. In the year 1120 the Bishop of Porto assumed the disguise of a beggar in order to pass safe and sound through the midst of men who were 'murderers, always ready for mischief, cruel and unrestrained,' and who spoke 'an unknown tongue.' It was doubtless they who, three centuries before, had plundered the rear-guard of the Frankish army, and slain the Roland of romance. The French pilgrim, Aimeric Picard, already referred to, speaks of the plundering habits of the mountain people, and of the severe tolls they levied from wayfarers, but testifies that they were good Catholics withal. A formal sentence of excommunication was declared at the third Lateran Council in 1179 against 'the Basques and Navarrese,' who 'practise so many cruelties upon Christians, plundering and ravaging just like pagans . . . without regard to sex or age.' The evidence of the hagiographers is to the same effect: among the many martyrs was St Léon, the first Bishop of Bayonne, killed about the end of the 9th century by 'pirates very cruel and satellites of the devil.' In the pages of Gregory of Tours, Trédégaire, Isidore, and others we find frequent notices of the plundering ravages of the mountaineers, and from time to time of more or less successful expeditions to punish them by the rulers on both sides of the Pyrenees. The waves of Moslem invasion hardly reached the base of their mountains, but hither fled the remnants of the routed Christian armies, and here began the reaction which was to

result in the 'reconquest.' The peoples who then inhabited the northern provinces of Spain, and who had remained independent, had at least hatred of the eastern conquerors in common, and gradually, under the guidance of enterprising leaders, they grouped themselves together, and formed a number of republics or federal states, from which grew the kingdoms of Asturias in the west; of the Sobrarve, then of Navarra and Aragon, in the east; and the 'lordship' of Vizcaya. Álava, nearer the Moors, constituted a *Behetria*, a word not understood exactly, but at least the government of the province was essentially oligarchic. Guipúzcoa and Labourd do not appear to have been raised to the dignity of distinct states, but merely to have comprised a number of territorial federations designated by the Spanish name of *Hermandades* ('fraternities'). La Soule and Lower Navarre were dependent upon the kingdom of Navarre and followed its fate; they comprised a number of vassal *vicomtés*, of which that of Soule had the longest history. The Labourd formed a *vicomté* under the dukes of Vasconie, afterwards of Aquitaine. Meantime the struggle with the Moors went on with varying issue—the most glorious day was the 16th of July 1212, when the kings of Navarra, Aragon, and Castile together overthrew the Mussulmans in the plain of Las Navas de Tolosa. Trophies of the victory may be still seen in the churches of Pampeluna and Roncevaux, and from that day on the shield of Navarra have figured the famous chains.

The fundamental history of all the Spanish states depends on the part they played in the 'reconquest.' Certain special privileges (Sp. *fueros*, Fr. *fors*) became attached to particular districts, dating from the time when these were granted in the face of a dangerous enemy, and later were exacted from the king or count at the settlement of the reconquered lands. All the provinces in the north of Spain had fueros of this nature, which ensured to them not merely exemption from particular imposts or burdens, but something like an actual autonomy, consisting chiefly in a more or less absolute exemption from compulsory military service, the right to free-trade, especially in tobacco and salt, the payment of taxes in a lump, and government through provincial *juntas* and officials born in the country. These juntas, which met every year at fixed times in some central building, or, as in Vizcaya, under the famous oak of Guernica, consisted of members elected by the countrymen, and with them sat the *corregidor* or representative of the king, and the intermediary between the local and the central authority. In the French provinces a *syndic* corresponded to the junta; a royal *bailli*, to the corregidor. These provinces did not consider themselves as forming an integral part of France or Spain, but were connected by the personal bond of the sovereign alone. Thus the States of Lower Navarre refused in 1649 to send deputies to the States-general of France; and in 1789, when the unity of France and its division into departments had been decreed, the representatives of that little 'kingdom' withdrew from the National Assembly. The Spanish provinces long watched with the most jealous care any encroachment of the crown upon their fueros. It was only in 1812, at the time of the Napoleonic usurpation, that Navarra for the first time sent representatives to the general *cortes* of the kingdom —to the famous Cortes of Cadiz. Vizcaya was annexed to Spain by a treaty in 1356; the *hermandades* of Guipúzcoa finally united themselves with Castile in 1200; while Álava, long under a particular fraternity of nobles with an elective overlord, finally yielded its rights by formal treaty to the king of Castile in 1332. In virtue of these conventions the kings of Navarra, and later, for the three other Basque provinces the kings of Spain, on their accession to the throne, swore solemnly to maintain the fueros of the provinces. In Vizcaya this ceremony took place under the oak of Guernica. During the insurrection of 1873–76 Don Carlos the younger revived the ancient ceremony. It was thus celebrated for the last time, for the Spanish government in 1876 suppressed the privileges of Álava, Guipúzcoa, and Vizcaya, just as it had those of Navarra in 1839, after the first Carlist insurrection.

The origin of the Basques is one of the most vexed questions of ethnology and philology alike. The controversy was first turned into a totally new direction by the publication at Berlin, in 1821, of W. von Humboldt's famous *Prüfung der Untersuchungen über die Urbewohner Hispaniens vermittelst der Waskischen Sprache*. The great German savant's argument was that the Iberians were a people spread over Sicily, Sardinia, Corsica, the Spanish Peninsula, southern France, and the British Isles, and that the modern Basques are the remnant of this race elsewhere expelled or absorbed. The main evidence offered was an attempted explanation of a large number of Spanish and other place-names by the known significations and forms of Basque words. This bold hypothesis long found enthusiastic support, but has since been much modified even by its own supporters. Anthropological research has proved the existence of a Neolithic race in Europe, of small stature, with long or oval skulls, and this race has been confidently identified with the Basques and Iberians. Sir W. Boyd Dawkins found the Iberian characteristics in 'the small dark Highlander,' 'the small swarthy Welshman,' and the 'Black Celts to the west of the Shannon.' Webster disposes of the identity between the dark Kelts and the Basques by proving that the Basques are a mixed race, exhibiting a fair as well as a dark variety, and that the former is on the whole the larger half of the present population. It must always be remembered that language and race are not convertible terms, and while the Iberians of ancient Spain may have spoken languages allied to the dialects of the Eskuara, there is no proof that all the tribes called Iberian by classical writers shared the heritage of a common speech. A flood of light may yet be poured on this question whenever the so-called Celtiberian inscriptions and coins—the *letras desconocidas*—shall be deciphered. But these still await their Champollion. There have been many clever theories and attempts at interpretation, but none as yet has gained a recognised authority. But when the day of true interpretation comes, it will mark a great advance in European archæology, and especially in our knowledge of the Basque question. Mr Rice Holmes thinks that the Basques occupied Spain and southern Gaul before the true Iberians (who spoke the language or languages of the inscriptions) arrived. Anthropological evidence, quite apart from the resemblances that have been traced between the Basque and Berber languages, led Collignon to associate the Basques with the White Hamites of northern Africa, Egyptians, and Berbers, not with the Finns and Esths.

See works by Vinson, Van Eys, Prince Louis-Lucien Bonaparte, Collignon, and Wentworth Webster.

Basra (also *Bassora* or *Bussora*), a port of 'Iraq, on the western bank of the Euphrates, here called the Shatt-el-Arab, 59 miles from its mouth in the Persian Gulf. The former Turkish vilayet of Basra (53,600 sq. m.; pop. 800,000) lay between Baghdad vilayet and the Persian Gulf. The river (known to seamen as the Basra River) is navigable by ocean-going steamers to above Basra, whence

smaller vessels ascend the Euphrates and the Tigris to Baghdad. The population, once 150,000, had sunk in 1854 to 5000, but has risen again to 80,000, thanks to steamship developments and the Baghdad Railway (terminating at Basra). Its proximity to Persia, Mesopotamia, Arabia, and the Persian Gulf makes Basra a trading-centre of high importance. Its chief exports are dates, barley, wheat, paddy, wool, seeds, opium, gall-nuts, carpets; imports include textiles, sugar, and wood for date-boxes. Basra was founded in 636 by the Khalif Omar, and soon became one of the most famous and opulent cities of the East. Subject of many contests between Turks and Persians, it is of great note in the history of Arabic literature. It was occupied by British troops on 21st Nov. 1914.

Bas-relief. See RELIEF.

Bass, MICHAEL THOMAS (1799–1884), of the famous Burton brewing firm of Bass & Co., founded by William Bass in 1777, was the son of M. T. Bass; he joined the business on leaving school, and afterwards acted as traveller. From 1848 till 1883 Bass represented Derby in the Liberal interest. His benefactions were very numerous, and included the building and endowing of St Paul's, Burton, and recreation-grounds, a free library, and swimming-baths for Derby. Of simple tastes, he declined more than once a baronetcy and a peerage. Both honours were conferred on his son, M. A. Bass (1837–1909)—the former in 1882, the latter in 1886, when he took the title of Baron Burton.

Bass, or BASE, in Music, is the deepest or lowest part, by whatever instrument it may be performed. Next to the upper part the bass is the most striking, the freest in its movements, and richest in effect. In respect to harmony, the bass is the most important part in music, containing more frequently the fundamental notes of the chords, while on it is formed that most important and effective figure in music called 'organ-point' or 'pedal-point'—i.e. the sustaining of one note by one part (ordinarily the bass) of the harmony, while the other parts go on independently. —Bass is also applied to the lowest and deepest male voice. The compass of a bass voice is generally from F below the bass clef to D above it, which should all be chest-notes, except, perhaps, the highest. Exceptionally deep voices are found in Russia, descending to C below the bass clef, and even farther. The bass voice begins to show itself only at the years of manhood, and is generally a change from the alto voice of a boy. It is much more largely used as a solo voice, especially in opera, since Mozart gave it prominence.—Bass or Bass Viol is also the name of an old stringed instrument, with from five to six strings, tuned variously to suit the music, and played with a bow. It was a sort of middle instrument between the contra-bass and violoncello, but is now out of use. Double Bass (q.v.) is the deepest-toned of stringed instruments. See also VIOL. For the Bass Tuba or bombardon, see SAXHORN; for the Bass Clarinet, Bass Drum, &c., see CLARINET, DRUM, &c. For the method of harmonising known as Figured Bass, see the article on Accompaniment, also those on Counterpoint, Harmony, Music, Orchestra, Voice.

Bass (*Morone labrax*), a fish of the sea-perch family (Serranidæ), somewhat perch-like in detailed structure, but salmon-like in shape and colour—blue-gray above, silvery below. It may attain a length of about 3 feet and a weight of nearly 30 pounds, but the measurements of most of those caught are much less. It occurs from the Mediterranean to the Atlantic coasts of Europe, and shoals often ascend rivers in the summer in pursuit of small fishes. It spawns in the sea near shore, and the eggs float. Bass afford good sport, for they are strong and cunning, and in spite of their natural voracity are capricious as to bait. Ancients and moderns unite in praising the delicacy of the flesh, which is sometimes improved by keeping the fish in fresh-water ponds, as the Romans did. The two European species of Bass must be called marine, though they sometimes explore rivers; two of the North American species spawn in fresh water and return to the sea like the salmon; two others have become permanent inhabitants of fresh water. The American Black Bass belongs to a different genus (*Micropterus*); it has been introduced into some English rivers. The name Stone Bass is applied to various fishes, such as *Polyprion cernium*, a perch-like fish which occurs as a rarity on British coasts, but is abundant in more southern parts of the Atlantic and in the Mediterranean. It is sometimes called the Wreck-fish, in reference to the way in which it follows wreckage, or ships on which barnacles are growing, and this it does apparently for the sake of small animals associated with the barnacles. It is easily taken, and is esteemed excellent for the table.

Bassac, a protected state in the French territory of Laos.

Bassam, GRAND and PETIT, two ports of the Ivory Coast, at the sea-entrance of the Ebrie lagoon. Grand Bassam was capital until superseded in 1900 by Bingerville, about 20 miles NW. On the landward side of the lagoon opposite Petit Bassam (renamed Port Bouet) is Abidjan or Abijean, from which a railway runs inland.

Bassa'no, a walled town of Italy, in the province of Vicenza, on the Brenta, 30 miles N. by W. of Padua by rail. It has a cathedral, and in the tower of Ezzelino is a fine library. Printing is the chief industry; and there is some trade in wine, olives, silk, and leather. In the neighbourhood Napoleon defeated the Austrian field-marshal Wurmser in 1796. Pop. of commune (1921), 19,959.

Bassa'no (or, more properly, GIACOMO DA PONTE), an artist of eminence, was born at Bassano in 1510, and studied for some time at Venice. He may be said to have founded a school, whose peculiarity was the delineation of common things, markets, fairs, cattle, and country scenes; but his famous altar-piece of the 'Nativity,' at Bassano, shows his power of handling sublimer subjects. The special merits of his style are its vigorous and picturesque colouring, and its accurate imitation of nature. He died in 1592, leaving four sons, who all followed their father's profession, but were not marked by any special originality of manner.

Bassas, two ledges of rocks to the south-east of Ceylon, distinguished as *Great* and *Little*—the former group being more to the south-west, and the latter, the most dangerous of the two, more to the north-east. They lie in 6° 11′–6° 22′ N. lat., and in 81° 28′–81° 43′ E. long. On both are lighthouses.

Basse. See BASS.

Bassein', (1) a thriving town in Burma, on the left bank of the Bassein River, one of the mouths of the Irawadi, 75 miles from the sea, but accessible to large ships. It is an important centre of the rice trade, has considerable trade with Madras, and in a military view also is important, as it completely commands the navigation of the stream. It was captured by the British in 1852. Pop. 37,000. The district of Bassein has an area of 4200 sq. m., and a population of 440,000.—(2) Bassein, a decayed town of 10,000 inhabitants, 28 miles N. of Bombay. Ceded to the Portuguese in 1534, it was a place of much importance as late as 1720, when the population

was 60,000; its remains still point to former splendour. In 1765 it was wrested from the Portuguese by the Mahrattas, and in 1780 surrendered to the British, after a twelve days' siege.

Bassendyne, THOMAS (died 1577), was King's printer in Edinburgh, and printed the New Testament (1576) and Lyndsay's works (1574).

Basses Alpes. See ALPES (BASSES).

Basses Pyrénées. See PYRÉNÉES.

Basset (Fr., 'dwarf'), a name used with some latitude in France for any very short-legged dogs, but specially for various breeds of sporting dogs resembling (though considerably larger than) the Dachs-hund (q.v.), known in France as *basset allemand*, as distinguished from the *basset français*. They may be divided into straight-legged and crooked-legged, and these again into rough-haired and smooth-haired. They vary in colour, but are frequently, like fox-hounds, tan on the head, and black and white on the body. Bassets (or basset-hounds) are used for tracking deer, boars, &c., and driving them out of coverts; and are best known as companionable pets.

Basse-terre (Fr., 'lowland'), the name of the capitals of St Christopher's (q.v.) and of Guadeloupe (q.v.) in the West Indies.

Basset Horn (Ital. *corno di bassetto*), the richest and softest of all wind-instruments, invented in Passau in 1770, improved by Lotz in Presburg in 1782. It is similar to a clarinet in tone and fingering, but has additional low keys, extending its compass to C in the bass clef, sounding, as the instrument is tuned in F, the F below.

Bassia. See BUTTER-TREE, GUTTA-PERCHA, OILS, SAPOTACEÆ.

Bassompierre, FRANÇOIS DE, Marshal of France, was born in 1579 at Harouel, in Lorraine, and came at the age of twenty to the French court, where he gained the favour of Henry IV. Appointed colonel of the Swiss Guards after the king's murder, he was raised to the rank of Marshal of France in 1622; was sent on embassies to Spain, Switzerland, and England; and bore an active part in the siege of La Rochelle. He became, however, an object of suspicion and dislike to Richelieu, who caused him to be cast into the Bastille in February 1631, from which he was not liberated until 1643, after the death of Richelieu. He himself died in 1646. Bassompierre was an accomplished courtier, extravagant in luxury, and excessively addicted to gallantries. At the time of his arrest he destroyed 6000 love-letters. The best edition of his *Journal de ma Vie*, written in the Bastille, is by the Marquis de Chantérac (4 vols. Paris, 1870–77).

Bassoon.

Bassoon (Ital. *fagotto*), an important wind-instrument of the reed species, made of maple-wood or plane-tree. The bassoon is an Italian invention; its name *fagotto* meaning 'a bundle,' probably from its being made in different pieces laid one against the other. The French call it *Basson de hautbois*; the Germans retain its Italian name. Its invention is attributed to Afranio, a canon of Ferrara, about 1539, but in some form it has existed from the earliest times. In the middle of the 16th century it had already reached great perfection. Sigmund Schnitzer, in Nuremberg, who died in 1578, was a celebrated maker. Those by Savary, a French maker, are now highly esteemed. The bassoon consists of a bored-out tube of wood in several pieces, fixed together alongside each other, the bore being conical, and doubled upon itself, so as to bring the holes and keys within the reach of the fingers of each hand. The bassoon has in general not less than 7 holes and 10 keys. In the narrow end of the wooden tube is fixed a small tapering brass tube in the form of an S, on the end of which is placed the reed for producing the tone. The compass of the bassoon is from B flat below the bass stave, to C or F in the treble. The fingering is complicated and variable in different patterns. The notes for the bassoon are written on the bass clef for the lower part, and on the tenor clef for the higher. The best keys for the bassoon are E flat, B flat, F, C, G, D, and A; all the other keys are difficult. It is scarcely known as a solo instrument, though there is some music for it as such—among others, concerti by Mozart and Weber; but it plays an important part in the modern orchestra, its tone being capable of very varied expression. The double bassoon (*contrafagotto*) is of similar construction, but sounds an octave lower. Bassoon is also the name of an organ-stop, the pipes of which are made to imitate the tones of the instrument.

Bassora. See BASRA.

Bassora Gum. See GUM.

Basso-rilievo. See RELIEF, SCULPTURE.

Bass Rock, a remarkable island-rock of Haddingtonshire, near the mouth of the Firth of Forth, 2 miles from Canty Bay, and 3¼ miles ENE. of North Berwick. Confronted by the ruins of Tantallon Castle, and formed by a Carboniferous volcanic neck of trachyte, it is about a mile in circumference, nearly round, and 350 feet high. It is inaccessible on all sides except the south, where it shelves down to the water, and there the landing is difficult, almost impossible when there is any swell. On the west, north, and east, the cliffs rise sheer out of the sea. They are denizened by countless numbers of solan geese and other birds, which give the rock a snowy appearance in the distance. A cavern tunnels into the rock from west to east, and is accessible at low tide. In 756 St

Bass Rock from the Shore.

Balthere or Baldred died in a hermitage on the Bass Rock; in 1316 it came into the possession of the Lauder family. In 1671 Charles II. purchased it for £4000, and within its dreary dungeons many

of the most eminent of the Covenanters were confined during his and James II.'s reign. The Bass was the last spot in the British Islands which held out for the Stuarts. Four young Jacobite prisoners had the address to capture, and, with twelve more who joined them, to hold it for King James, from June 1691 till April 1694, against all the forces which William III. sent against them; at last the spirited little garrison surrendered on honourable terms, and only from a consciousness of failing provisions. In 1701 the fortifications were demolished. Five years afterwards the Bass passed into the possession of Sir Hew Dalrymple. There is a light-house (1902). See an interesting volume on the Bass, by Hugh Miller and four others (1848).

Bass Strait, the channel which separates Tasmania from Australia, contains many islands, chiefly in its southern section, and is greatly beset by coral-reefs. It runs almost due east and west, is about 180 miles long, and has an average breadth of about 140 miles. It was named after Dr George Bass, surgeon of H.M.S. *Reliance*, who settled the question as to its existence. After a preliminary voyage, he sailed round Tasmania in 1798 in a barque of 25 tons, and proved it to be an island.

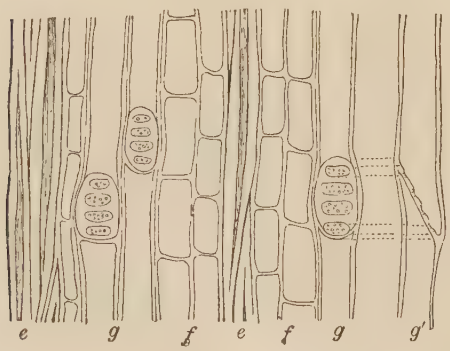
Bass Tuba. See SAXHORN.

Bass Viol. See VIOL.

Basswood, the American lime-tree or linden, as producing much bass or bast.

Bast. See BUBASTIS.

Bast, or PHLOEM (formerly often called *Liber*, *Inner Bark*, *or Endophlœum*; see BARK), is a term applied by botanists to distinguish that portion of the fibro-vascular bundle which is characterised by the presence of sieve-tubes, from the woody portion which is distinguished by the presence of vessels (see BARK, PHYSIOLOGY (VEGETABLE), DICOTYLEDON, &c.). These sieve-tubes (produced by the longitudinal union of cell-rows, and in communication by means of protoplasmic threads through oblique sieve-like partitions) are, like the wood-vessels, accompanied by a residue of undifferentiated cells, the *bast parenchyma*. These two elements constitute the *soft bast*, and through this layer the elaborated sap descends from the leaves throughout the plant. This region is recognisable under the microscope by the exceeding



e, bast fibres; *f*, cells of soft bast; *g*, vessels of soft bast, with four-perforate sieve-plates seen on the surface of an oblique septum; *g'*, section through septum and sieve-plates.

delicacy and transparency of the walls of sieve-vessels and bast parenchyma alike, and by the presence of protoplasmic contents; while in longitudinal section, the characteristic 'sieves' (which are not, however, always very easy to observe) furnish an additional characteristic (see fig.). In the soft bast also there may frequently occur *Laticiferous Vessels*, but these are by no means essential to its structure. Juxtaposed to this soft bast we find the hard bast, which is entirely composed of cells, greatly elongated and thickened into the *bast-fibres*, and to this the important mechanical properties of bast (and consequently, for the most part, the strength, hardness, and toughness of bark) are essentially due. A bast-fibre has frequently a tensile strain greater than that of steel, and the varied economic applications of bast essentially depend upon the fineness and toughness of the fibre; thus the fibres of hemp, flax, jute, &c. are nothing else than bast. The name bast, however, is more usually applied to the inner bark of trees, and is common to the Teutonic languages, designating the inner bark of the Lime (q.v.) or linden-tree, which is employed for making a coarse kind of ropes, mats well known as bast-mats, and a kind of shoes much worn by the Russian peasantry. The trees are cut when full of sap in spring. For bast to be plaited into shoes, young stems of about three years old are preferred; and it is said that two or three are required to make a single pair of shoes. Trees of six or eight years old are cut down for the better kind of mats, which are exported in large quantities from Russia, particularly from the port of Archangel, and which are much used for packing furniture, covering tender plants in gardens, supplying strands with which plants are tied, &c. The trees from which the bast is taken are very generally burned for charcoal. After the bark is dried, its layers are easily separated by steeping in water. The finest layers are the inner, and the coarser are the outer ones.—The manufacture of bast-mats is nearly confined to Russia and Sweden. Lime-tree bast is used in the south of Europe for making hats. The name bast-hat is, however, often given to a hat of willow-wood planed off in thin ribbons, and plaited in the same manner as straw-hats. The inner bark of *Grewia didyma* (Tiliaceæ) is used for rope-making in the Himalayas. See RAPHIA.

Bastard, in English law, is a child not born either in lawful wedlock or within a competent time after its determination. In England a bastard could, till 1926, be made legitimate for all purposes only by an act of parliament, 'as was done,' says Blackstone, 'in the case of John of Gaunt's bastard children by a statute of Richard II.' In Scots law, and in most Continental systems of law, a child born out of wedlock may be legitimated—that is to say, become a lawful child by the subsequent marriage of the mother of the child with the father; but English law did not permit this mode of legitimation. The English courts, indeed, applying the principles of private international law, recognised that a child born out of wedlock became legitimate on the marriage of his parents, provided that the father of the child were domiciled, both at the date of the child's birth and at the date of the subsequent marriage, in a country in which legitimation *per subsequens matrimonium* obtained; but even in that case English law, while it recognised that the legitimated child is capable of succession to personal property, did not permit him to inherit land in England. Although there is a strong presumption that a child begotten or born during marriage is legitimate, that presumption can be overcome by evidence that no sexual intercourse in fact took place between the husband and wife within such period as is consistent with the husband being the father of the wife's child.

A bastard is incapable of inheriting real property as heir, or of acquiring a share of personal estate as next of kin, to any one dying intestate. So, too, there can be no collateral succession to or through a bastard, for he cannot have any heir or next of kin except the issue of his own body. A bastard is not entitled either to the name of his reputed

father or that of his mother, though he may acquire for himself a surname by reputation. In a will a bequest to 'children' is taken as referring to legitimate children only; unless there are circumstances or expressions inconsistent with that interpretation. Nor does a bastard follow, as legitimate children do, his father's place of parochial settlement under the poor-laws, but he has and follows the settlement of his mother until he attains the age of sixteen, or until he acquires a settlement in his own right, and after that age his primary settlement is in the parish where he was born. Another peculiarity of the status of bastardy is that a bastard being *filius nullius* ('nobody's child'), the consent of his father or mother to his marriage is not required, and is of no avail; but a guardian may be appointed by the Court of Chancery for the purpose, or a license may be granted upon oath made that there is no person authorised to give consent. To this may be added that although in general a father may by deed or will appoint, in the event of his decease, a guardian for his infant child, he has no such privilege if the child be illegitimate.

In other respects, a bastard is very much in the same position as a legitimate person. Thus he can hold land in fee-simple, and can dispose of it as he may think proper, and he can make a will bequeathing his whole estate—a privilege which was not conceded to bastards in Scotland dying without lawful issue till the year 1836. In regard to his personal estate, although the crown is entitled to such in the case of a bastard dying intestate, the royal claim is not strictly enforced; but upon petition the crown's right will be waived in favour of the bastard's family. In the Scots law also the crown may, by what is called a *gift of bastardy*, grant not only the personal but also the real estate of an intestate bastard to the 'donatory,' or person similarly entitled, as in the case of personal property in England. Practically the same effect is produced by royal letters of legitimation during the bastard's life. It is also to be observed that the prohibitions as to marriage which extend to collaterals, and to those related by the half-blood only, also apply although one of the parties be a bastard. Again, the laws relative to incest apply to a bastard. Under the Workmen's Compensation Act, 1906, where a workman has been killed by an accident arising out of and in the course of his employment, an illegitimate child of the workman is entitled to compensation as a 'dependant' of its parent. Similarly, the parent of an illegitimate child is entitled to compensation as a 'dependant' of his child.

In England the maintenance of an illegitimate child devolves in the first instance on the mother. She is for this purpose entitled to its custody in preference to its father; and she is bound to maintain it as part of her family while she remains unmarried, or until the child attains the age of sixteen, or gains a settlement in its own right, or (being a female) is married; and in the event of the mother's marriage, the same liability attaches to her husband. If the mother be of sufficient ability to maintain the bastard while he is thus dependent on her, and neglect that duty, so that he becomes chargeable to a parish, she is liable, by 7 and 8 Vict. chap. 101, sect. 6, to be punished under the provisions of the Vagrant Act. By the Poor-law Act of 1844, as amended by the Bastardy Acts of 1872–1923, the putative father may be summoned and compelled to make a proper allowance, not exceeding twenty shillings a week, for the support of the child till sixteen. This is called Bastardy Order. The father's liability under the order is not released by an order of discharge in bankruptcy. By the Affiliation Orders Act, 1914, the justices of each petty sessional division or borough are to appoint an officer of court, known as a 'collecting officer,' to collect sums due under such orders.

The chief points in which (till 1926) the position of a bastard differed in Scotland are that he is fully legitimated by the subsequent marriage of the parents, and that the mother has the right of custody only until the age of seven in males and ten in females. This right of the mother to the custody may be suspended in the interest of the child. Up to these ages the father is bound to contribute one-half to the support of the bastard, the other half being furnished by the mother. Thereafter the father may offer to undertake the custody and aliment of the child. The mother is entitled to refuse this offer, but in that event she has no right to enforce further contribution by the father to the child's support. In a question with the poor-law authorities, the father remains liable for the child's support until it is able to support itself.

Both in England and Scotland the widow of a bastard, whether there be issue or not of the marriage, is entitled to dower, terce, *jus relictæ*, and all the other legal rights of widows. See AFFILIATION, DIVORCE, HEIR, ILLEGITIMACY, LEGITIMATION, MARRIAGE, SUCCESSION, ULTIMUS HÆRES, VAGRANTS.

In the United States also a bastard is one born of an illicit connection, and before the lawful marriage of its parents; one begotten and born out of lawful wedlock. A man is a bastard if born during coverture under such circumstances as to render it impossible that the mother's husband can be his father, or if born beyond a competent time after the coverture has determined. A bastard has no right of inheritance at common law, and the principal right he has is that of maintenance by his parents. In most states, children born before the marriage of their parents are made legitimate by the subsequent marriage of their parents. See FITZ, BATON-SINISTER.

Bastard Bar. See BATON-SINISTER.

Bastardy, DECLARATOR OF, a suit which may be instituted in the Court of Session in Scotland for having it declared that the lands or effects which belonged to the deceased bastard belong to the donatory in virtue of the gift from the crown. A donatory is usually named by the crown upon application to the Exchequer by parties interested; but in order to complete the title to estate which belonged to the bastard, it may be necessary for the donatory to sue a declarator of bastardy.

In English law, where the existence of a legal right or of a claim to property or to a dignity depends upon the legitimacy of a particular person, the question of the legitimacy of that person may be determined by the court. This is so whether the person whose legitimacy is in question be alive or dead, or whether he be a party to the proceedings or not. The Legitimacy Declaration Act, 1858, enables any British subject, who is domiciled in England or Ireland, or claims some real or personal estate in England, to apply to the Divorce Division of the High Court for a decree declaring him to be legitimate.

Bastia, the former capital of Corsica, is picturesquely situated on a mountain slope, rising from the sea in the form of an amphitheatre, 95 miles NNE. of Ajaccio by rail. Its streets are narrow and crooked, its harbour still somewhat difficult of access, yet it has considerable shipping. Antimony-mining, boat-building, iron-founding, tanning, and coral-fishing are carried on; besides, there is some trade in chestnut-wood extract, wine, and fruit. Pop. (1926) 36,376. Founded in 1383 by the Genoese Leonello Lomellino, it was the seat of the Genoese governors for 400 years. It has several

times been in the hands of the English, who, under Admiral Hood, last captured the town in 1794, after an obstinate and protracted siege. When Corsica was divided into two French departments, it was made the capital of one; but when both were united in 1811, the seat of government was transferred to Ajaccio.

Bastian, ADOLF, German traveller and anthropologist, born at Bremen, 26th June 1826, studied at Berlin, Heidelberg, Prague, Jena, and Würzburg, and in 1851 sailed for Australia as a ship's doctor, thereafter travelling in North and South America, Europe, Asia, Africa, and where not else besides. No equally well-equipped ethnologist has ever travelled so widely, and no single observer has accumulated such a mass of invaluable materials for the history of man. It would be difficult to overestimate the indebtedness of the science of anthropology to the practised eye of one restless traveller. His thirty works record his observations in almost as many countries of the world. The most important are in *Der Mensch in der Geschichte* (3 vols. 1860), *Die Völker des östlichen Asien* (6 vols. 1866–71), *Ethnologische Forschungen* (2 vols. 1871–73), *Schöpfung oder Entstehung* (1875), *Die Vorstellungen von der Seele* (1875), *Vorgeschichte der Ethnologie* (1881), *Zur Naturwissenschaftlichen Behandlung der Psychologie* (1883), *Allgemeine Grundzüge der Ethnologie* (1884), *Religionsphilosophische Probleme* (1884), *Der Fetisch an der Küste Guineas* (1885), *Die Mikronesischen Kolonien* (1900), and *Die Völkerkunde und der Volkerverkehr* (1900). He died in February 1905 on a naturalist's expedition in Trinidad.

Bastian, HENRY CHARLTON (1837–1915), physiologist, was born at Truro, Cornwall, and from a private school at Falmouth proceeded to University College, London, where he became professor of Pathological Anatomy (1867), hospital physician (1871), and professor of Clinical Medicine (1878). His works include *Modes of Origin of Lowest Organisms* (1871), *Beginnings of Life* (1872), *Evolution* (1874), and *The Brain as an Organ of Mind* (1880), the fullest scientific exposition till then published of the views on the subject of psychology held by the extreme physiological school. In later works he championed the doctrine of Spontaneous Generation (q.v.).

Bastiat, FRÉDÉRIC, an eminent political economist, was born at Bayonne in 1801. His father was a merchant, and educated his son with a view to the same calling. In 1818 Bastiat entered the commercial house of one of his uncles at Bayonne, and employed his leisure hours in the study of political economy. In 1825 he withdrew from the business, and gave his time to study, especially of economics, extending his knowledge afterwards by travels in Spain and England. Circumstances led him to examine the movement in England for the repeal of the Corn Laws. His first appearance as an author was in 1844, when he published in the *Journal des Economistes* an article on the influence of French and English tariffs on the future of the two peoples. It contained in germ his theory of political economy, and Bastiat from that time was a decided opponent of the system of protection. In 1845 he published a work entitled *Cobden et la Ligue, ou l'Agitation Anglaise pour la Liberté du Commerce*, containing the speeches of the English free-traders. In 1846 he settled in Paris, and devoted his energies to the cause of free-trade. He became secretary of the societies, and chief-editor of the journal established to vindicate its principles; and published his *Sophismes économiques*, in which he attacked the protective system with great wit and controversial acumen. After the revolution of 1848, he was elected successively a member of the Constituent and Legislative Assemblies. From this time till his death, his strength was applied chiefly to controverting the socialism which became so prominent during the revolution. Suffering from pulmonary disease, he repaired to Italy for change of climate, but died at Rome on the 24th December 1850.

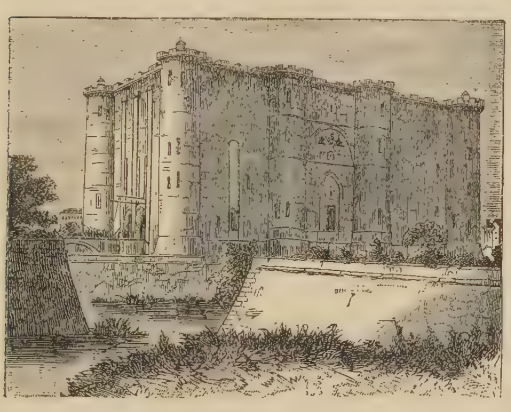
Besides the writings mentioned, Bastiat published *Propriété et Loi, Justice et Fraternité—Protectionisme et Communisme, Harmonies économiques*, and several other important tractates, all of which exhibit extensive knowledge of the subjects discussed, vigorous logic, and a power of sprightly and biting satire (new ed. of his works, 7 vols. Paris, 1881). The *Sophismes* and the *Harmonies économiques* were translated into English by P. J. Stirling.

Bastide, JULES, a French journalist and politician, Minister of Foreign Affairs in 1848, and member of the Constituent Assembly, was born at Paris in 1800. Bastide was early conspicuous among the radical writers of Paris. Holding a command in the National Guard, he took part in an insurrectionary movement in June 1832, and was condemned to death, but escaped to London. Pardoned in 1834, he returned to Paris, and again devoted himself to politics in the columns of the *National*, and in 1847 he founded the *Revue Nationale*. During the revolution of 1848, he was a supporter of General Cavaignac and an opponent of socialism. In 1858 he published *La République Française et l'Italie en 1848;* and in 1859, *Guerres de Religion en France*. He died March 3, 1879.

Bastien-Lepage, JULES, French painter, born at Damvilliers, November 1, 1848, studied under Cabanel, and early began to attract notice by his impressionist, but strong and real pictures in the Salon. Some of his more important works were 'In Spring,' 'The First Communion,' 'The Shepherds,' 'The Wheat-field,' 'The Beggar,' and 'Joan of Arc listening to the Voices.' Striking portraits were those of his grandfather, his father and mother, Sarah Bernhardt, André Theuriet, and the Prince of Wales (Edward VII.). He died of a painful and lingering disease at the height of his fame, December 10, 1884. See works on him by A. Theuriet (trans. 1892) and G. Clausen (1892).

Bastille, a French term for a fortress defended by bastions, was used in this sense in England also after the Norman Conquest. The famous prison to which the name was latterly appropriated, was built by order of Charles V., between 1370 and 1383, by Hugo Aubriot, Prévôt or Provost of Paris, at the Porte St Antoine, as a defence against the English. From the first, however, it was used as a state-prison, Aubriot himself being confined there on suspicion of heresy. During the 16th and 17th centuries it was greatly extended and provided with strong bulwarks. On each of its longer sides the Bastille had four towers, of five stories each, over which there ran a gallery, which was armed with cannon. It was partly in these towers, and partly in underground dungeons, that the prisons were situated. The unfortunate inmates of these abodes were sometimes so effectually removed from the world without as often to be entirely forgotten. But on the whole it afforded comfortable quarters, and prisoners were usually treated with much consideration. The Bastille was capable of containing 70 to 80 prisoners, a number frequently reached during the reigns of Louis XIV. and Louis XV. These prisoners were usually criminals; but some few were victims of political despotism, court intrigue, ecclesiastical tyranny, or family quarrels, and were lodged here in

virtue of *Lettres de Cachet* (q.v.)—noblemen, authors, savants, priests, and publishers. At the beginning of the French Revolution on the 14th of July 1789, the fortress was surrounded by an armed mob eager to destroy the stronghold of tyranny. The garrison consisted of 42 pensioners and 32 Swiss. The negotiations which were entered into with the governor led to no other result than the removal of the cannon pointed on the Faubourg St Antoine, which by no means contented the exasperated multitude. Some cut the chains of the first drawbridge, and a contest took place, in which one of the besieged and 150 of the people were killed or severely wounded; but the arrival, with four field-pieces, of a portion of the troops which had already joined the people turned the fortune of the conflict in favour of the besiegers. Delaunay, the governor—who had been hindered by one of his officers from blowing the fortress into the air—permitted the second drawbridge to be lowered, and the people rushed in, killing Delaunay himself and several of his officers. The destruction of the Bastille commenced on the following day, amid the thunder of cannon and the pealing of the *Te Deum*. The event in itself was apparently of no great moment, leading only to the release of three unknown prisoners—one of whom had been there for thirty years—and of four forgers. In that event only the 654 persons whose names now appear on the column in

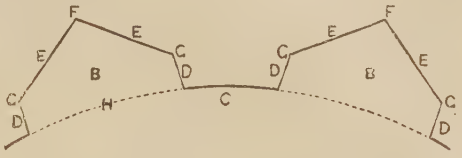


The Bastille.

the Place de la Bastille took part, yet it finally broke the spirit of the court-party, and changed the current of events in France. The Bastille had long been regarded as the stronghold and symbol of tyranny, and its destruction was everywhere hailed as the downfall of an evil system. 'But,' said the king when the news was brought him, 'that is a revolt.' 'Sire,' said De Liancourt, 'it is not a revolt—it is a revolution.' See Carlyle's *French Revolution* (ed. Rose, 1903); books by Bingham (1888), Funck-Brentano (1915).

Bastina'do (from Fr. *baston* or *bâton*, 'a cudgel'), the name given by Europeans to the punishment in use over the whole East, which consists in blows with a stick, generally upon the soles of the feet, but sometimes upon the back.

Bastion, part of a system of Fortification invented by the Italian engineers about the middle of the 16th century, and generally used until the introduction of the present polygonal system by the Germans at the beginning of this century. A fortified town is usually surrounded by a deep ditch with masonry sides, behind which is the rampart forming a polygon of many sides. It is important to flank this ditch so as to prevent the enemy collecting in it, and this is done either, as in modern fortresses, by constructing a projecting work in front of the centre of each face of the polygon, or, as formerly, by making bastions at each of its salient angles. The plan of one *front*—i.e. two bastions and the *curtain* or wall connecting them, is given below, with the names of the different lines forming the *trace*. The distance between the



B, bastion; C, curtain; D, flank; E, face; F, salient; G, shoulder; H, gorge.

bastions varies from 200 to 600 yards; a greater distance would make the fire from the flank dangerous for the defenders of the face flanked. The main part of a bastion is the rampart, an immense mound of earth, faced with brick or stone, capable of supporting heavy guns, and of receiving the fire of the enemy. A *hollow* bastion has the space behind the rampart kept down to the level of the natural ground; a *solid* bastion is filled up to the level of the rampart. Vauban devised the plan of having large *detached* bastions opposite the chief angles of the place, with a ditch behind each; a tower or small bastion being placed at the real angle of the wall behind. See FORTIFICATION, SIEGE.

Basutos, a South African people whose country, now directly under the British crown, lies in the angle between the Cape Province, the Orange Free State, and Natal. Basutoland (area, 11,716 sq. m.) is a high and rugged plateau, with a mean altitude of about 6000 feet. The Maluti Mountains occupy much of the interior; the Drakensberg (q.v.) separate Basutoland from Natal and the Cape. It is well watered, produces abundant grass for cattle, and, with its fine climate, is said to be the best grain-producing country in South Africa. The Basutos (better, the Basuto) seem to be a fusion of several Bechuana tribes under a dominant Zulu clan, who early in the 19th century were organised into a powerful state by the famous Moshesh (Mosheshwe, born about 1792). But after 1815 Chaka and his Zulus began a bloody series of wars that changed the balance of power in South Africa, utterly destroyed some peoples, and would have exterminated the Basutos but for their mountainous fastnesses and the help of the Boers. Moshesh and the Basutos received French missionaries gladly, sought to learn the wisdom of the white man, but objected strongly to the settlement in their country either of Boers or of Britons. From 1858 they were intermittently at war with the Boers of the Orange Free State, and in 1868 sought British protection. They were annexed to Cape Colony in 1872, but the attempt to disarm them led to violent resistance (1879–81), and in 1884 Basutoland was placed directly under the British crown, with a paramount chief controlled by a Resident Commissioner under the High Commissioner for South Africa. The natives have a National Council. European settlement is prohibited, and there are only 1400 white men in the country—officials, traders, and missionaries. The capital, Maseru (pop. 1500), is connected with Bloemfontein by rail. There are mission stations at Mafeteng, Morija, &c. The schools are mostly under the Paris Evangelical Mission Society.

Basutoland joined the South African Customs Union in 1891. The population has increased from 170,000 (1884) to about 500,000. They have 433,000 cattle and 87,000 horses; wool, wheat, mealies, and Kaffir corn are the principal products; and coal is raised. Stock, grain, and wool are exported. See books by Lagden (1909) and Ellenberger (1913).

Bat. Bats form an order of mammals in which the fore-limb is modified for flight. To this fact their technical name Chiroptera (Gr., 'hand-winged') refers. The order includes a large number of widely distributed forms, and most people are familiar with the swift and curious flight of some of the common species which hunt for food in the twilight.

History.—Aristotle is often libelled by being accused of regarding these mammals as birds; but he was quite incapable of such a crude mistake. His successors were not, however, and many naturalists down to a couple of centuries ago were content to accept the popular appreciation of these animals as 'unclean fowls,' or to regard them as altogether hopeless puzzles. In 1683 John Ray referred them, with his usual clearness, to the class Mammalia; and Linnæus in 1748 gave them an honourable position along with man and monkeys in the highest mammalian order of Primates. Though often regarded as birds by those who are careless of zoological system, such popular names as Flitter-mouse (Ger. *Fledermaus*) indicate some appreciation of their true position. They are now most accurately described as a special order of much modified Insectivora.

General Characters.—Since bats are Insectivora modified for aërial locomotion, the most striking general character concerns the structures used in flight. A true wing is present, and consists of a skin-expansion spread out between the four fingers, and extending to the sides and to the hind-legs. An accessory membrane extends from the tail to the hind-legs. The fore-legs are much better developed than the hind pair—a marked exception to the general rule. The strong shoulder-girdle, the capacious chest, the very hollow bones of the limbs, the keel on the breast-bone, the position of the teats on the breast, the simple uterus and generally single birth, and many other general characters, are to be interpreted as adaptation associated with the flying habits of these mammals. The discoidal deciduate placenta, the comparatively low brain with uncovered cerebellum, and other features are shared with the Insectivora, and point to the origin of the bats from that group.

Classification and Distribution.—Two natural sub-orders may be distinguished—I. Megachiroptera, fruit-eating forms—generally large, with smooth crowns on the longitudinally grooved grinders, usually with a claw on the third joint of the first finger, inhabiting the warm parts of the eastern hemisphere; II. Microchiroptera, mostly insect-eating forms—generally small, with sharp insect-crunching tubercles on the transversely grooved grinders, with a usually single-jointed, never clawed, first finger, inhabiting the tropical and temperate regions of both hemispheres. (1) The frugivorous large bats form the family Pteropodidæ, including the African Epomophorus, the 'flying fox' Pteropus, most abundant in the Malayan and Australian regions, but never occurring in Africa, the Cynonycteris of the Egyptian pyramids, the very common Indian bat Cynopterus, and other genera. (2) The smaller insect-eating bats form much the larger sub-order. They comprise five families: (*a*) the Vespertilionidæ, including the common Pipistrelle and other Vesperugo species, the abundant North American Nycticejus, &c.; (*b*) the family Nycteridæ, such as the large Queensland form (*Megaderma gigas*) (fig. 3), the common Indian species (*M. lyra*), and the very peculiar genus Nycteris of the Ethiopian region;

Fig. 1.—The Greater Horseshoe Bat (*Rhinolophus ferrum-equinum*), flying.

(*c*) the family Rhinolophidæ, very highly developed bats, with complicated sensory nasal appendages—e.g. Rhinolophus and Phyllorhina; (*d*) the family Emballonuridæ, cosmopolitan forms with obliquely truncated snouts—e.g. Emballonura, Noctilio, Molossus, the New Zealand Mystacina, &c.; and (*e*) the family Phyllostomidæ, inhabiting Central and South America, and often characterised by nasal appendages, including the remarkable *Mormops*, the Vampire genus, the blood-sucking Desmodus, &c.—The known fossil forms, going back apparently to the Upper Eocene, are all highly specialised, so that the Chiroptera must have diverged from the Insectivora at a very early date.

Structure.—The membranes of flight, the short hind-legs, the capacious chest, the frequent presence of nose-leaves, have already been noticed as external features which at once catch the eye. Some of the characteristic structures must be noted, however, at greater length: (*a*) *Skin*—The skin is more highly developed in bats than in any other order of mammals. On the one hand it is modified to form the flying fold, extending (1) from the shoulder along the upper arm to the thumb; (2) between the four fingers, and thence onwards to the legs; (3) between the back of the legs and the posterior extremity of the body. On the other hand the skin comes into close association with the sensory function of touch which bats are well known to possess in such a remarkable degree. Spallanzani showed that bats deprived of sight, hearing, and smell, could in a marvellous way fly about a room without colliding with numerous threads hung across it; they could fly through crooked passages, and detect the approach of a hand and the like. Fine nerve-filaments are spread out on the skin of various regions, such as the sides of the muzzle, the outer ear, the nose-plaits, the wing-membrane, &c. The margins of the nostrils and glandular eminences on the sides of the snout are in many forms developed into curious, much folded, leaf-like appendages, kept soft by the secretion of numerous oil and sweat glands, and rendered sensitive by the abundant distribution of nerve-endings. In some cases attaching suckers are developed near the thumbs. Scent glands and bags are frequently present as secondary sexual characters. (*b*) *The skeleton*—Three types of true wing occur among vertebrates. In the extinct Saurian Pterodactyls (q.v.) the skin forming the wing was mainly stretched on the greatly elongated little finger. In the wing of birds the digits are greatly reduced and modified. In bats, the

bones of the palm (metacarpals) and joints of the four fingers are greatly elongated to serve as supports to the greater part of the membrane of flight. The clawed thumb is not included in

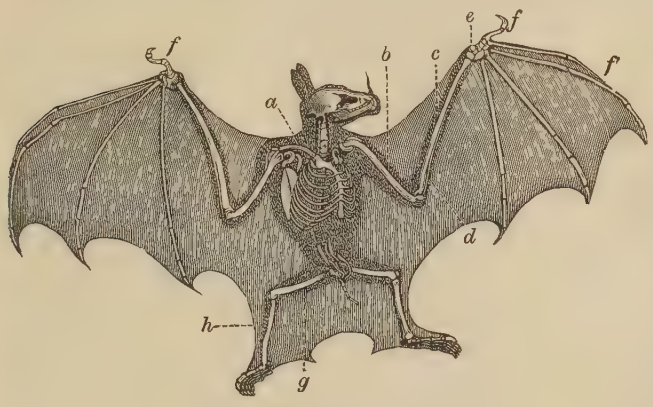


Fig. 2.—Skeleton of *Phyllostoma hastatum*: *a*, clavicle; *b*, humerus; *c*, radius; *d*, ulna; *e*, carpus; *f*, thumb; *f'*, finger; *g*, femur; *h*, tibia.

the wing, but is used for attachment or in the shuffling and awkward attempt at walking. The hind-leg is also utilised in flight as the support of the posterior membrane, and has undergone a curious rotation so that the knee is directed backwards. The claws of the hind-feet are used to attach the bat to the branch or support on which the animal usually rests head downwards. The breast-bone has a keel for the attachment of the powerful muscles working the wings, and thus to some extent recalls the similar structure on the sternum of flying birds. The whole shoulder-girdle is very powerful, and the hip-girdle very weak. In the insect-eating forms, where skilful steering through the air is required, the long tail serves as a sort of rudder. The skull and teeth vary greatly in relation to the different kinds of food. The bones are all slender, and the marrow canals in those of the limbs are especially large.

Fig. 3.—*Megaderma gigas*, sleeping.

(*c*) *Other structures*—The alimentary canal varies with the nature of food, being simpler and shorter in the insect-eating smaller bats. An exceptional type is exhibited by the blood-sucking Desmodus, where the blood is probably stored up in a long blind process from the stomach region. The brain is of a low type, but the tactile sensitiveness of the bats exceeds that of any other order. How the lips, nostrils, external ears, &c. come to be delicate organs of touch has been already noticed. The testes are on the abdomen or on the groin. The placenta by which the young bat—generally only one—is attached to the wall of the simple or horned uterus, is discoidal and deciduate (see PLACENTA), and the two mammary glands are situated on the chest or under the armpits.

Habits.—Almost all the bats are nocturnal, and sleep during the day hitched up by their hind-legs, with their wings drawn over them. They come out in the twilight to hunt for food, and then their shrill squeak may not unfrequently be heard. The proverbial simile 'as blind as a bat,' must refer to their dazzled behaviour during the day, for they can see exceedingly well with their sharp eyes. Even apart from eyes they are able to steer their way adroitly, as the experiments of Abbé Spallanzani and others have shown. What Cuvier demonstrated in regard to the abundant distribution of nerves on various parts of the body is now known to be the correct explanation of their marvellous sensitiveness. It is also interesting to notice that the circulation of blood in the wings is so active as to amount almost to an inflammation—a suggestive fact in connection with their tender sense of touch. Bats hybernate in winter, and are found in caves, barns, belfries, forests, &c. in large numbers. A minority feed on fruits, but most are insect-eaters, while a few (not including the vampire) suck the blood of small, and occasionally even of large mammals. The males and females often live apart.

Important Forms.—Among the large fruit-eating bats, the Flying Foxes (*Pteropus*); the Great Kalong (*Pteropus edulis*), the largest of the bats (14 inches long); the fig-eating South African Epomophorus; and the destructive Indian Fruit-bat (*Cynopterus marginatus*) may be mentioned as representative. Some of these do great damage to fruits of various kinds. Among the smaller insectivorous forms, the Vespertilio alliance includes the Horseshoe Bats, of which two species (*Rhinolophus ferrum-equinum* (fig. 1) and *R. hipposideros*) occur in Britain; the Lyre Bat (*Megaderma lyra*), often called vampires in India, and said sometimes to eat smaller bats, frogs, fish, &c.; the Desert Bat (*Nycteris thebaica*), which inflates its skin with air so as to form a balloon; the common Long-eared Bat (*Plecotus auritus*), often in church towers; the

Fig. 4.—Barbastelle, walking.

Barbastelle (*Synotus barbastellus*); the Noctule (*Vesperugo noctula*), the Pipistrelle (*V. pipistrella*), and two other species of Vesperugo occurring along with the four last-named bats in Britain; one of the two New Zealand bats (*Chalinolobus tuberculatus*); the Whiskered Bat (*Vespertilio mystacinus*), common in Europe, and also recorded in England. The thick-legged bats, or Emballonuridæ, are represented by such forms as the Mountain Bat (*Emballonura monticola*), living

a social life on the solitary mountains of the Eastern Archipelago; the Tomb Bat of Egypt (*Taphozous perforatus*); the curious Egyptian Rhinopome (*Rhinopoma microphyllum*), abundant in the darkness of the Pyramids; the very ugly Collared Bats

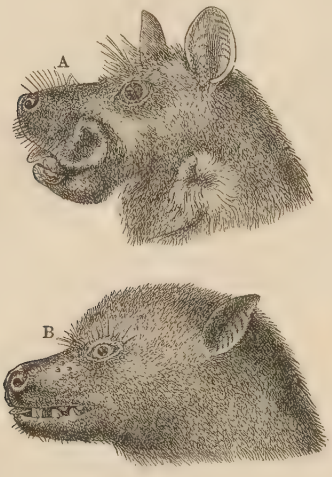


Fig. 5.—Heads of (A) *Epomophorus gambianus*, (B) *Pteropus rodericensis*

with folded skin (*Chiromeles torquatus*); the short-tailed New Zealand Bat (*Mystacina tuberculata*), which is fonder of walking than most of its kind. This species of bat, and the *Chalinolobus* noted above, 'represent the whole indigenous mammalian fauna of New Zealand.' The 'vampires,' or

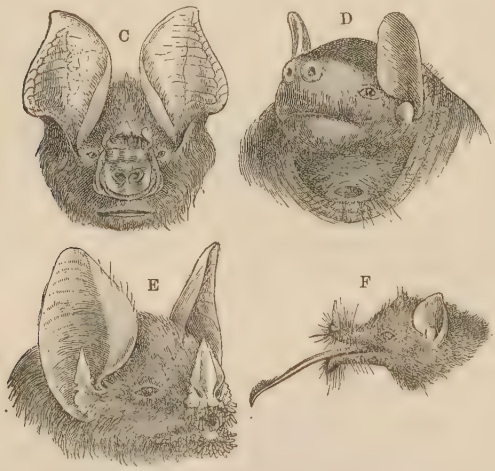


Fig. 6.—Heads of (C) *Phyllorhina tridens*, (D) *Chiromeles torquatus* (female), (E) *Trachyops cirrhosus*, (F) *Chæronycteris mexicana*.

Phyllostomidæ, include a number of blood-sucking forms, but the chief guilt in this connection must be laid to the charge of Desmodus, which sometimes attacks mammals of considerable size, and even man. The Vampire Bat itself (*Vampyrus spectrum*) must be acquitted.

Bats form an order of great interest and importance to the naturalist. From a practical point of view they are of some importance so far as the one set destroy fruit-crops, and the others make up for this by destroying insects, while only a very few are somewhat more sanguinary. See MAMMALS, VAMPIRE; Sir W. Flower's 'Mammalia' in *Ency. Brit.*, 9th ed.; Dobson's *Catalogue of Chiroptera in British Museum* (1878), and his *Asiatic Chiroptera*; and *Mammals of Great Britain and Ireland*, by J. G. Millais (1904).

Bata. See RÍO MUNI.

Batangas, a seaport town of the Philippines, the capital of a province in the south-west of the island of Luzón, 50 miles S. of Manila. It was founded in 1581, and is well built, lying on an extensive bay which opens into the Strait of Mindoro. Pop. of commune, 33,000.

Batatas. See SWEET POTATO, IPOMŒA.

Bat'avi, an old Teutonic people who inhabited a part of the present Holland, particularly the island named from them *Insula Batavorum* (modern *Betuwe*), which is formed by the branch of the Rhine that falls into the sea near Leyden, by the Waal, and the Meuse. Their country extended southward across the Waal. Under Augustus they became allies of the Romans, and earned for their fidelity the honourable title of friends and brothers of the Roman people, and were permitted to choose their commanders from amongst themselves. Their cavalry were famous, and were often employed by the Romans.

Bata'via, properly the name of the island occupied by the ancient Batavi, became at a later date the Latin name for Holland and the whole kingdom of the Netherlands. The name Batavian Republic was given to the Netherlands on their new organisation of 16th May 1795, and they continued to bear it till they were converted into the kingdom of Holland, under Louis Bonaparte, 8th June 1806.

Bata'via, the capital of the Dutch East Indian possessions, stands on the NW. coast of Java, near the mouth of the Tjiliwong, frequently called the Jaccatra, from the former native town, on the ruins of which the present city was built. The river, which is small and shallow, is connected with a network of canals which intersect the town. The influence of a vertical sun on the canals of this Holland in miniature made Batavia become proverbial as the grave of Europeans. The temperature, though not extreme, is oppressive from its uniformity, the mean of winter being 78·1° F., and that of summer only 78·6°. Latterly, however, the climate has been greatly improved by draining, and most of the merchants live in the healthier suburbs, which occupy higher ground farther inland, the principal being Weltevreden ('well-content'), Molenvliet, Rijswijk, Noordwijk, and Koningsplein. In some of these suburbs, which form the new town, the houses stand in spacious gardens with trees around them. The old town was formerly surrounded with walls and fortifications, and till 1808 was not merely government headquarters, but the main centre of population. But in that year the walls, useless since the complete subjugation of Java, were demolished, and the seat of government was transferred from the town on the swampy and unhealthy low grounds to Weltevreden, 2½ miles farther inland. Now the old town contains mainly shops, stores, offices, and the houses of natives and Chinese. During the day, however, it is a busy place; and in it are still the town-house, the exchange, the great poorhouse, a hospital, &c. Steam and electric tramways, electric-light, telephones, and other modern conveniences are fully taken advantage of. The bay is spacious, but very shallow towards the shore, and Batavia is accessible only to boats. Accordingly in 1876–86 the government constructed a great harbour 5 miles to the eastward at Tanjong Priok (where there is a very secure anchorage), with two breakwaters, an outer and inner port, and a coal

dock. And thereafter there was a marked increase in the shipping and commerce of Batavia and its port. Batavia rivals Singapore as a commercial emporium of the far East. Its markets present at once all the productions of Asia and all the manufactures of Europe. There are close and direct commercial communications with Singapore, all the Dutch East Indies, Australia, the Netherlands, Britain, and Germany. The chief exports are coffee, rice, indigo, cinchona, tobacco, hides, arrack, sugar, palm-oil, cajeput-oil, tin, pepper, teak, buffalo horns and hides, tea, cassia, sapan wood, tortoise-shell, and tamarinds. The imports comprise cottons, woollens, silks, machinery, iron goods, wine, butter, articles of luxury, and ice (from America). Batavia possesses, besides the citadel and government offices, a society for the arts and sciences, founded 1778; a society for the study of Eastern geography, ethnography, and languages; a national history society, a chamber of commerce, an agricultural society, a gymnasium, a great medical school, and various other educational and learned institutions. In 1811, while Holland was under France, Batavia was taken by the British, but was restored to its former owners in 1816. There is a telegraphic cable of 600 miles from Batavia to Singapore, and a railway from Batavia to Buitenzorg (seat of the governor-general, 36 miles S., with a famous botanic garden) and other points in the interior. Pop. 290,000.

Batavia, a city of western New York, on Tonawanda Creek, 36 miles NE. of Buffalo by rail. It has several mills, and manufactures of sashes and blinds, ploughs, and farming-implements, and is the seat of the state institution for the blind (1868). Pop. 14,000.

Batchian. See MOLUCCAS.

Batchka. See BACSKA.

Bateman, an American family several members of which have won distinction on the stage. HEZEKIAH LINTHICUM BATEMAN (1812–75), born at Baltimore, managed various theatres in America, and in 1871 took the Lyceum in London. This venture threatened failure, but turned to success by the production of *The Bells* with Henry Irving as Mathias.—His wife, SIDNEY FRANCES COWELL (1823–81), daughter of an English actor, was an actress and dramatist, and after her husband's death managed Sadler's Wells Theatre. She was the first to bring over an American company in an American play, Joaquin Miller's *Danites.*—Their daughter KATE JOSEPHINE BATEMAN, born at Baltimore, 7th October 1842, appeared on the stage at the age of eight along with her younger sister ELLEN (born 1845). In 1860 she acted in her mother's play *Evangeline* in New York. At Boston in 1862 she made her first appearance in one of her most famous parts, the Jewish maiden Leah in an adaptation of Mosenthal's *Deborah.* In 1863–64 she appeared in this character for 210 nights at the Adelphi Theatre in London. On her marriage to Dr George Crowe in 1866 she left the stage for about three years. A later triumph was in the part of Medea (1872), in an adaptation of Legouvé's tragedy. Notable also was her Lady Macbeth, which she played with Irving. After 1881 she appeared little on the stage. She died 8th April 1917.—Miss Bateman's other sisters, VIRGINIA and ISABEL, also became well-known actresses. The former, born in 1854 at Cincinnati, married Edward Compton the actor, and became the mother of Compton Mackenzie the novelist.

Bates, HENRY WALTER, F.R.S., naturalist and traveller, was born at Leicester, 8th February 1825. During his apprenticeship to a manufacturing hosier, he formed a friendship, due to kindred love of natural history, with Mr Alfred R. Wallace, then master in the Collegiate School. In April 1848 the two left to explore the Amazon, where Bates remained till June 1859. In 1861 he published his distinctive contribution to the theory of natural selection in a paper explaining the phenomena of Mimicry (q.v.). The narrative of his travels, *The Naturalist on the Amazons,* which at once took high rank, appeared in 1863. In 1864 he was appointed assistant-secretary of the Royal Geographical Society, which post he filled till his death, 16th February 1892. Bates was pre-eminently a philosophical naturalist, his special study, that of beetles, being mainly for the light which that vast order throws on the theory of descent.

Bateson, MARY, a scholarly historian, daughter of William Henry Bateson (1812–81), Master of St John's College, Cambridge, was born on the 12th of September 1865 at Robin Hood's Bay, Yorkshire. She was educated at schools in Cambridge and Karlsruhe, entered Newnham College in 1884, and won a first class in the Cambridge historical tripos in 1887. She began to teach at Newnham in 1888, and with interruptions continued to do so for the rest of her life. She took much interest in the affairs of the college, and had a prominent part in the founding of historical research fellowships, one of which she held herself in 1903–6. Influenced successively by Mandell Creighton and F. W. Maitland, she gave her attention first to mediæval monastic history, and published among others an important article on double monasteries, and later turned to municipal history. She edited the *Records of the Borough of Leicester* in three volumes (1899–1905), the *Charters of the Borough of Cambridge* (with Maitland, 1901), *The Cambridge Gild Records* (1903), and two volumes of *Grace Book B* (for the Cambridge Antiquarian Society, 1903–5). The Selden Society published her *Borough Customs* in two volumes (1904–6), of which Maitland said, 'Neither Thomas Madox nor yet John Selden will resent the presence of Mary Bateson' on the same shelf. Appointed one of the editors of the *Cambridge Mediæval History* in 1906, she died on the 30th of November of that year. Besides the works named, she contributed much to periodicals, the *Dictionary of National Biography,* and various miscellanies; edited George Ashby's poems (E.E.T.S.), and (with Mr R. L. Poole) Bale's *Index Britanniæ Scriptorum,* and wrote a volume on *Mediæval England* (1903) for the 'Story of the Nations' series.—Her brother, WILLIAM BATESON (1861–1926), biologist, born at Whitby, and educated at Rugby and St John's College, Cambridge, wrote *Materials for the Study of Variation* (1894), *Mendel's Principles of Heredity* (1902), and *Problems of Genetics* (1913). He was professor of biology at Cambridge (1908–9), director of Merton Park Horticultural Institution from 1910, and in 1914 president of the British Association.

Bath, the chief city of Somersetshire, is beautifully situated in the wooded valley of the sinuous Avon, 11¾ miles ESE. of Bristol, and 107 W. of London. Its houses are built wholly of white freestone—'Bath oolite,' worked in the neighbouring quarries—brick being entirely discarded (see BATH-STONE). Set in a natural amphitheatre, with Lansdown Hill (813 feet) to the north, the city has a finer appearance than any other in England, the variety of level giving very commanding sites for its fine and regular streets, crescents, circus, and public buildings. The beauty and sheltered character of its situation, the mildness of its climate, and especially the curative efficacy of its hot chalybeate springs (containing radium) have long rendered Bath a favourite resort. The springs, which supply the baths, were known to the Romans, who here in the 1st century A.D. built baths, of which extensive remains were

discovered in 1755, 1881, and 1896. A large portion of these has been uncovered, including an oblong bath 80 feet in length by 40 in breadth, and a circular bath 32 feet in diameter. The temperature of the springs varies from 97° to 120° F.; they rise near the river-bank, in the centre of the city, and discharge about 500,000 gallons of water daily. The water is most useful in bilious, nervous, and scrofulous complaints, palsy, rheumatism, gout, and cutaneous diseases. Though the gaiety of Bath has greatly waned since the days of Beau Nash (q.v.), there has been a great general improvement in the city. It has a beautiful park (1830) and many open spaces; a theatre, concert-rooms, and other places of amusement; the literary and scientific institution, museum, club-houses, good hotels, &c. Noteworthy edifices are the Assembly Rooms (1771), the Guild-hall (1766), the Pump-room (1797), the Mineral Water Hospital (1737–1861), and the new baths. The Abbey Church (1499–1616) is a cruciform Late Perpendicular structure, with a fine fan-tracery ceiling and a central tower 162 feet high. In 1864 and subsequent years the interior was thoroughly restored by Sir G. G. Scott. Of other churches the finest is the Roman Catholic Priory Church (1863), with a spire 200 feet high. On Lansdown Hill is Beckford's Tower, 130 feet high, built by the eccentric author of *Vathek*. South of the city is Prior Park, built in 1743 by Ralph Allen, Pope's and Fielding's friend, for a time a Catholic college. Bath returns one member to parliament, and conjointly with Wells (q.v.) gives name to a diocese. It has given name to a kind of bun, to a biscuit, to wheeled invalid-chairs, but probably not to bathbrick. Coal is found in the neighbourhood. Pop. (1881) 51,814; (1921) 68,648. Traditionally founded by a British prince, Bladud (863 B.C.), Bath is really of great antiquity. It was a Roman station called *Aquæ Sulis*, at the intersection of the great Roman ways from London to Wales, and from Lincoln to the south coast. The site of the Roman forum is known; and remains have from time to time been discovered of temples, altars, and pavements. Richard I. granted Bath its earliest extant charter, which was subsequently confirmed by Henry III., and greatly extended by George III. Bath figures frequently in literature, in the works of Smollett, Fielding, Anstey, Madame D'Arblay, Jane Austen, Dickens, &c.

See Warner's *History of Bath* (1890); Sir G. Jackson's *Archives of Bath* (2 vols. 1873); and books by Scarth (1864), Peach (1873–93), King and Watts (1885), and Barbeau (1904).

Bath, a city and port of Maine, U.S., is situated on the west bank of the Kennebec River, 35 miles S. of Augusta. Shipbuilding is the chief industry, in which it takes high rank amongst American cities. It is an important commercial centre, and owns much shipping, as its river possesses good anchorage and docks, and the harbour never freezes over. Bath was incorporated as a town in 1780, and as a city in 1850. Pop. 15,000.

Bath (Earl of). See Pulteney.

Bath, Order of the. The name of this English order of knighthood is derived from the ceremony of bathing, which used anciently to be practised at the inauguration of a knight, as an emblem of the purity henceforth required of him by the laws of chivalry. The order does not seem to be older than the reign of Henry IV., who, at his coronation in 1399, made 46 esquires Knights of the Bath. Knighthood of the Bath was afterwards from time to time conferred on occasion of great national ceremonials. Charles II. made 68 Knights of the Bath at his coronation, but from that time the dignity fell into oblivion till revived by George I. in 1725 as a military order, consisting of the sovereign, a grand-master who should be a prince of the blood, and 36 knights. At the conclusion of the great war it was thought expedient, with a view to rewarding the merits of many distinguished officers, both military and naval, to extend the limits of the order, which was effected on the 2d January 1815. But the order was still purely military, and it was not till 1847 that it was placed on its present footing by the admission of civil knights, commanders, and companions. In June 1861 it was further enlarged. Of the first class are the Knights Grand Cross (G.C.B.); of the second, Knights Commanders (K.C.B.), who take precedence of Knights Bachelors. Companions (C.B.) take precedence of Esquires, but are not entitled to the distinctive appellation of knighthood.

The officers of the order are the Dean (who is the Dean of Westminster), Bath King of Arms, the Registrar and Secretary, and the Gentleman Usher of the Scarlet Rod. On the revival of the order in 1725, Henry VII.'s chapel at Westminster was made the chapel of the order, where the stall-plates and banners of the knights were placed over their stalls.

The insignia belonging to the first class are the collar, badge, ribbon, star, mantle, surcoat, under

Star, Collar, and Badge, G.C.B. (Military).

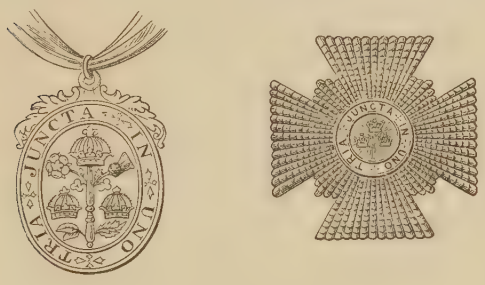
habit, and cap. The collar is of gold, composed of nine imperial crowns and eight roses, thistles, and shamrocks, issuing from a sceptre and enamelled of their proper colours, all united together with seventeen knots enamelled white. The badge of a military G.C.B. is a gold Maltese cross enamelled white, each of its eight points terminating in a gold ball, and in each of the four angles a lion of England; in the centre, on a ground of white enamel, are the rose, thistle, and shamrock, issuing from a gold sceptre between three gold imperial crowns, within a red circle charged with the motto of the order, *Tria juncta in uno*, and surrounded with two branches of laurel in proper colours, issuing from an escrol of blue enamel, containing, in gold letters, the legend *Ich dien*. The badge of a civil G.C.B. is an oval entirely of gold, the external fillet containing the motto of the order, and encircling the above device of the rose, thistle, shamrock, sceptre, and three crowns. The badge is suspended from the collar on occasions when the latter is worn; at

other times it hangs from a broad red ribbon placed across the left shoulder. The star of a military G.C.B. is formed of rays of silver, thereon a gold Maltese cross charged with three imperial crowns, one and two, within a circle of red enamel charged with the motto of the order in gold letters, and surrounded by two branches of laurel issuing from an escrol like that of the badge. That of a civil G.C.B. has the same circle and central device, with rays of silver in the form of a glory issuing from the centre. The mantle is of crimson silk, lined with white silk, with the star embroidered on the left side, and a lace of white silk on the left shoulder. The surcoat is of the same materials as the mantle. The cap is of black velvet, with a plume of white ostrich feathers.

The insignia of the second class are the badge, ribbon, star, mantle, under habit, and cap. The badges, military and civil, are like those of the first class, but smaller, and the ribbon is narrower. The star of the military K.C.B. differs from that of the military G.C.B. in omitting the Maltese cross, and is in form a cross patée. The star of a civil K.C.B. differs from that just described in omitting the branches of laurel and the escrol and its legend. The mantle and cap are nearly similar to those of the G.C.B.

Companions of the Bath have for insignia only the badge, civil or military, as above described, but of still smaller size.

Knights Grand Cross of the Bath are entitled to supports. Both G.C.B. and K.C.B. place a red



Badge and Star, K.C.B. (Civil).

circle containing the motto of the order outside their arms, with the badge suspended from it, military knights having outside the circle the two branches of laurel, escrol, and legend, as above.

See *The Most Honourable Order of the Bath*, by Jocelyn Perkins (1913).

Bath-brick. See BRIDGWATER.

Bathgate, a town of Linlithgowshire, 20 miles W. by S. of Edinburgh by rail. Freestone, coal, limestone, and shale (since 1852) have been wrought in the vicinity. There are also paraffin and paper works, a distillery, &c. In 1824 the town became a burgh of barony, in 1865 a police-burgh. Its chief buildings are the corn exchange, the academy, and the parish church—a Norman edifice of 1884, with a clock-tower 108 feet high. Sir James Simpson was a native. Pop. 8500.

Bathing. See BATHS.

Batho'meter. See SOUNDING.

Bathonian, Bath Oolite. See JURASSIC SYSTEM.

Bath'ori, or BATORY, the name of a noble Hungarian family that gave a line of voivodes to Transylvania in the 16th and 17th centuries, and one king (Stephen, 1575–86) to Poland. Elisabeth, niece of Stephen Bathori, king of Poland, and wife of the Hungarian Count Nádasdy, caused young girls to be put to death in the dungeons of her castle, that she might renew her own youth by bathing in their warm blood.

The details of the monstrous story are probably exaggerated, but it at least shows that she was conceived capable of it. When at length, in 1610, inquiry was made into the appalling rumours, it was discovered that this female fiend had caused to be murdered no fewer than 650 maidens. Her accomplices were burnt; but she was shut up for life in her fortress of Csej, where she died in 1614. See Baring-Gould's *Book of Werewolves* (1865).

Ba'thos (Gr., 'depth') is a term employed by critics to designate a ludicrous descent from the elevated to the commonplace in writing or speech, or a sinking below the ordinary level of thought in a ridiculous effort to aspire (see CLIMAX). It is of the essence of bathos that he who is guilty of it should be unconscious of his fall, and while grovelling on the earth, should imagine that he is still cleaving the heavens. A good example of bathos is the well-known couplet:

> And thou, Dalhousie, thou great god of war,
> Lieutenant-general to the Earl of Mar!

or the well-known encomium of the celebrated Boyle: 'Robert Boyle was a great man, a very great man; he was father of chemistry and brother to the Earl of Cork.'

Baths. *History of Baths.*—We find in history many records of the use of baths either for luxury or medicinal purposes amongst widely separated nations and peoples. The use of heat in some form or other dates from the earliest times, and allusion is made to this fact in Grecian mythology. Andromache is spoken of as preparing a bath for Hector, while we are told Penelope endeavoured to allay the depression caused by her husband's long absence by means of baths and unguents. The weary Herakles was strengthened and refreshed, we are informed, at the springs of Thermopylæ by Athena. On his return from Ithaca, Ulysses found his aged father, Laertes, in what we would now term a 'condition of senile debility,' and promptly advised the use of warm bathing. Hippocrates speaks of the use of warm and tepid baths as a cooling agent in fevers; and Plato also deals with the use of baths in various morbid conditions. Galen and Celsus both advocated warm bathing in hyperpyrexia, and so on. Wherever the Roman Empire extended itself by conquest, baths were erected. They are found in many districts in Britain—first and best known at Bath; also at Corbridge, in Northumberland, near Hadrian's Wall; at Bearsden, in Dumbartonshire; and elsewhere.

About the 5th century bathing rather fell into desuetude in Rome itself, largely owing to the scarcity of water caused by the destruction of the aqueducts by the Huns. But at one time there were no fewer than 850 baths in Rome, some of which accommodated one thousand bathers—of a size, in short, which few cities can boast of at the present day. It is known also that vapour-baths were used by the ancient Mexicans and North American Indians.

Various Types of Baths.—The general conception of a bath to the average person is one of water, either hot or cold. But an almost infinite variety of substances can be used in this connection.

(1) Vapour, such as hot air, compressed air or steam.

(2) Ordinary cold rain or river water, sea-water or brine, such as we find at Droitwich and Nantwich. Droitwich brine contains 30 per cent. of common salt, or about ten times as much as ordinary sea-water.

(3) Mud-baths, peat-baths, sand-baths, and sea-weed baths.

Most remarkable of all is the type of vapour-bath used by some uncivilised races, made of the freshly removed skin of some animal, such as a sheep or horse.

Dealing more fully with *water* as a medium for a bath, we have to refer to some of its special constituents and qualities. One of the most important of these is radioactivity. The most active water in this respect, according to Sir William Ramsay, is that of Bath, in so far as the British Isles are concerned. On the Continent the baths of Bad Gastein are specially strong. Much of the benefit derived from medical bathing is at the present day attributed to radioactivity, but whether there is very solid ground for this belief or not is largely a matter of opinion. But radioactivity is certainly not peculiar either to Bath or any of the spas, as it is a quality in greater or less measure of both rain-water and snow, and even tap-water is found to possess it to some extent. Some waters are found strongly impregnated with sulphur, others with arsenic, and others, again, with iron. It is doubtful whether any of these last are absorbed by the skin to any considerable extent, though sulphur undoubtedly benefits some skin conditions from its topical effect.

Temperatures commonly employed are:

Very hot	115°–125° F. (over 46° C.).
Hot	100°–103° F. (37° to 40° C.).
Warm	90°–93° F. (32° to 34° C.).
Tepid	70°–80° F. (21° to 27° C.).
Cool	59°–64° F. (15° to 18° C.).
Cold	40°–50° F. (4·5° to 10° C.).
Very cold	25°–30° F. (−4° to −1° C.).

The Foot-bath is a most valuable domestic remedial agent. Hot at 110° to 112° F., it is very useful in headache and coryza. It should last about ten to twelve minutes. The effect is enhanced, of course, if mustard be added. A breakfast-cup of mustard bran should be sufficient. A cold foot-bath is sometimes helpful in sleeplessness: the feet are immersed for three to four minutes, and then briskly rubbed with a Russia towel.

The Sitz-bath.—The patient sits in the water with his thighs resting against his abdomen, knees and legs covered with a blanket or rug. The hot bath is very comforting in some painful abdominal conditions—relieves head congestion, also various spasmodic conditions. A cold sitz-bath of two or three minutes' duration is a very bracing tonic procedure, and may be employed as an early morning bath. If given for a longer period, it should be followed by a short, brisk walk.

The Plunge-bath.—The bath should be about half-full to admit of the person taking it moving about and splashing freely without upsetting the water. The temperature should be about 15° to 22° C., according to the robustness and capacity for reaction of the bather. The bath lasts from one to three minutes. It has a markedly stimulating effect on respiration and circulation, and makes a healthy person feel warm and comfortable. This is probably the most usual form of bath employed as a matter of routine daily by the average person.

Rain-bath or Circle Douche.—Many modern bath-rooms in large houses are fitted with these. The appliance consists of two parts—the shower, a perforated rose about a foot in diameter, about eight feet from the floor, from which the water falls in a fine spray on the bather; and, secondly, the circle douche, which consists in a series of tubes bent into a circle perforated at frequent intervals. There are five to six of these arranged, one above the other, at about six inches apart. The bather thus is situated in a vortex of horizontal sprays, and the effect is most bracing and stimulating. The bath is usually begun with warm water, and gradually reduced to cold—as low as 10° to 15° C. if the patient can stand it.

Vichy Douche.—The patient lies on a rubber mattress or canvas stretcher, and water is projected on to him from a series of roses arranged above him, so that the whole length of the body is under treatment. At the same time the bathman massages the limbs and trunk systematically. The warm water, of course, renders the joints and muscles more flaccid and easier of treatment. The bath is somewhat relaxing, and lowers the blood-pressure, but is much enjoyed by, and very beneficial to, certain subjects.

The Aix Douche closely resembles it. Here the patient sits instead of lying, and is handled by two operators or bathmen. Each has a hose with a rose-nozzle at the end slung over his back, and water from this is projected on to the part to be massaged at a suitable temperature. This bath is also tiring and relaxing, but very beneficial in rheumatic conditions. At Aix patients frequently take them day after day, but fatigue is saved by the carrying of the patient to and from his rooms or hotel well wrapped up, and rest is enjoined after the bath.

The Modus Operandi of Baths, &c.—It will be well to consider briefly the principles controlling the use of baths, hot or cold, and their effect on the human economy. In man there are two factors tending to maintain a constant bodily temperature. The first is physical regulation, and the second chemical regulation.

Physical Regulation.—The chief seat is the skin, which has been appropriately described as the largest gland in the body. When cold is applied—cold air or cold water—and then withdrawn, a rush of blood takes place to this gland—the skin surface—constituting what is known popularly as the *reaction*. On its intensity largely depends the efficiency of the bath and the well-being of the subject of it. If reaction be sluggish, it may be enhanced by the application of heat prior to the cold, or by the use of mitten friction, slapping, or by the addition of brine or other substances to the water. Mustard, for instance, will produce a very smart reaction, which may be excessive, and more than the skin will bear. It is absolutely essential, if cold baths are not to have a prejudicial effect on a person's health, that he experience an adequate reaction. The faculty of having a reaction may be acquired. If tepid water be used first for a brief period and slapping employed, and then the temperature gradually reduced after some days, the patient may eventually be able to stand the coldest water, and have a very healthy reaction after, and experience a comforting glow of heat and sense of well-being. Usually if the bather gets a glow very rapidly it passes off, and shivering will begin later. A healthy reaction does not usually become noticeable immediately cold water is applied.

The Chemical Effect.—Baths have a chemical effect on the body through the action on metabolism or tissue change.

The colder the bath, the more rapid is the heat-loss. Most heat is lost in the first minute of the bath, and then it gradually decreases. Failing a healthy reaction, further heat is lost by radiation, conduction, and evaporation, and at the same time heat production in the body is interfered with. If an adequate reaction has taken place, the loss by radiation and conduction is scarcely noticeable. Shivering, which takes place if a proper reaction has not occurred, is really a conservative effort of nature, for the involuntary but active movements of the muscles which take place must be regarded as a protective agent against cold. The tonic effect of cold baths is to be seen often in the improvement in the muscle-tone of the person taking them—a stronger nervous system and will-power.

There is at present rather a reaction against the cold bath, however. The thing may be overdone, and it is questionable if the Spartan ordeal of a tub in one's room on which the ice has to be broken in the winter is good for the average person. Persons of feeble constitution are much wiser to have a tepid bath, and cold sponge down the spine to finish.

The Japanese favour hot baths up to 125° F., which calls for some training. Few Europeans can stand hot water to the whole skin surface above 108°, and even that may produce giddiness and fainting. A hot bath of short duration is, however, just as tonic in character as a cold one. A warm bath of 90° to 95° F. is relaxing at all times.

Medicated Baths.—Baths may be medicated in various ways—by the addition of acids or alkalis, pine extract, mustard, and so on. A nice, soothing bath in some irritable skin conditions is made by adding half a pound of baking soda to 30 gallons of water at 100° F. Sulphur baths may be prepared from sulphurate of potash (3 oz. to 30 gallons), or from a preparation known as Sulphaqua, obtainable at any good chemist's. Pine baths, very soothing and pleasantly aromatic, are made from extract of pine-needles, a somewhat tarry preparation obtained from the Black Forest. About 4 oz. is needed for a 30-gallon bath. Carbonic acid baths are made in various ways—by passing pure carbonic acid through the water from a cylinder, or by charging the bath with bicarbonate of soda first, and then adding formic acid. These last are useful in heart disease of certain types, and are similar to the Nauheim baths, the water at Nauheim being, however, naturally effervescent, and charged with what is known as *mutterlauge* (mother-liquor). Mustard baths cause a very brisk reaction in conditions of chill after exposure, &c. Care is needed in estimating the quantity of mustard for each individual, as what some people may stand with perfect equanimity would produce in others a smart erythema. From a tablespoonful upwards in 30 gallons of water might be tried. Mustard bran, a special preparation of a coarser and more dilute kind, is used. Brine baths are at their best at Droitwich, Nantwich, and Salzburg, where the natural hot brine is to be had; but a very good imitation may be made at home with coarse fishery salt, adding 1 lb. to the gallon or more. People with tender skins must again beware.

Mud-baths and Peat-baths.—The best application of this kind is the Fango-bath or pack. The mud, which is obtained at Battaglia or Acqui, is of volcanic origin. Peat-baths, Moorbäder, and Schlammbäder are other varieties. Fango is a soft, grayish-brown, plastic substance of the consistence of butter, and equally soft to the touch. It has no odour, being entirely free from sewage contamination. It is applied at about 44° C. or 110° F., like a large poultice, and both conveys heat and retains it. It is most useful in many forms of rheumatism, lumbago, rheumatoid arthritis, sciatica, &c. It can be obtained at various resorts on the Continent—Baden, Schaffhausen, and Kissingen—and in this country at Matlock Bath and Peebles. Peat or moor baths consist of a soft mass of siliceous mud, containing both organic and inorganic matter. They are given at a temperature of about 50° C. or 120° F., or even higher. Duration is from half-an-hour to one hour. They are useful in gout, rheumatism, neuritis, lumbago, &c. Sand-baths are sometimes used for raising the body temperature and exciting the skin. Local hot sand-baths may be used for rheumatism, by baking sand in a tin, and then plunging the hand in it when a suitable temperature has been reached. They are used at Harrogate, Peebles, and Lavey in Switzerland.

Turkish Bath.—This is a very ancient form of bath, somewhat waning in popularity now owing to the more rapid methods of producing perspiration, such as the hot-air cabinet and the electric-light bath, with which many large modern houses are equipped at the present day. In Rome and other cities in Italy the ruins of Turkish baths used in the time of Nero may be seen. One so complete and well-preserved as to be used regularly at the present time is to be seen in Jerusalem, which dates from the time of Herod, nearly two thousand years. The amount of space required and expense involved in the construction of a good Turkish bath restricts its presence to anything but towns of fairly large size. It consists usually of two rooms, and perhaps a dressing and shampoo room as well. The hot room, or calidarium, is usually heated to about 110° C. or 230° F. The tepidarium runs from 44° to 54° C. (130° F.). There is sometimes either a hotter or cooler room than either of these. The shampoo-room is furnished with marble douche-slabs, on which the patient is lathered and massaged, and he usually finishes off with a plunge into a small swimming-bath or a warm spray. The dressing-room is furnished with suitable couches, on which the patient should rest from thirty to forty minutes after a bath, and perhaps refresh himself with a cup of coffee. The rooms are usually heated from a coke furnace, and must be very carefully ventilated, at once to avoid draughts and subsequent headache. The outlet for foul air should be near the bottom of the room, opening into a ventilating-shaft. For the average person fifteen to twenty minutes in the hot room and half-an-hour in the cool is enough to produce a profuse perspiration, but, of course, different subjects vary greatly. No one should suddenly take up Turkish baths unless he has been examined and passed as fit by a medical man. People past sixty should be particularly careful, as headache, dizziness, and an apoplectic attack may be easily induced. Patients with high blood-pressure and kidney disease past middle life should on no account take them. The powerful stimulation of the sweat-glands usually results in considerable loss of weight, for the time being at any rate; but some individuals gain weight on a course of the baths, and feel exceedingly fit.

The Russian Bath.—This is really a steam or vapour bath, the patient being shut into a small chamber, adequately ventilated, into which steam is slowly introduced through perforated pipes. The temperature is about that of the warm room in the Turkish bath, the moisture rendering high temperatures unbearable. The average duration is fifteen to twenty minutes. This bath suits some people with dry skins who do not perspire readily or at all in the Turkish bath. The patient finishes with a spray or shampoo, as in the Turkish. In both the above baths the comfort of the patient is increased by a damp towel around the head, and, if there be any tendency to headache, a warm foot-bath may be used as well.

Public Baths.—The use of public baths by the Romans has been above referred to. Their introduction into this country was postponed until many centuries after the Roman occupation. It is not highly creditable to the national cleanliness that not until the year 1846 was an act passed to enable parish councils and vestries to establish baths and wash-houses, the expenses of which were chargeable on the rates. In 1878 a further act, amended in 1880, permitted the erection of swimming-baths. These are now very generally found in all large towns. In Japan mixed bathing is considered quite orthodox, but in this country it is almost invariably the custom for the sexes to be strictly kept apart. Swimming-

baths vary considerably in size, but the depth is usually 6 feet 6 inches at one end and 3 feet at the other. While drowning accidents in such places are very rare, they are by no means unknown, and some means of rescuing any one in difficulties should be at hand—a long pole or a lifebuoy, for instance. The water is usually slightly warmed to about 55° to 60° F. Needless to say, it is important to indicate very plainly which is the shallow end of the bath, as diving from the wrong end has at times ended fatally. On the Seine very agreeable swimming-baths are formed by means of a sort of floating platform with no centre-piece. A stair leads down from the bank or street to the turnstile; dressing-boxes are all round, then a 6 to 8 foot platform; while in the centre a large swimming-bath is provided by the waters of the Seine flowing through, and, of course, constantly renewing the bath-water.

Sea-bathing.—Sea-bathing is probably the most interesting to most people, and is very health-giving if used with discretion. Needless to say, the pleasure is enormously added to if the bather can swim. In this climate sea-bathing earlier than May or later than September is a doubtful pleasure, and not suited to any but the most robust. At Brighton there are a few habitués who usually pride themselves on their New Year 'dip,' but this is not common or desirable. Young people are apt to tire and exhaust themselves in summer by staying in the water too long, and a hot sun on the head may produce unpleasant sensations. Twenty minutes to half-an-hour is quite enough for an average person to begin with, swimming or otherwise; and a rest should be taken after for a little. Care should be taken invariably when bathing in a new district to ascertain from some one knowing the locality the nature of the beach, the slope, presence of rocks, and currents of tidal nature, &c. Many of our summers are marred by tragic drowning accidents which would have been avoided had reasonable precautions of this character been taken.

Electric Baths.—The electric water-bath is not now much used. Water being a better conductor of electricity than the human body, the major portion of the electric current employed passes through the water and not the patient. Probably the latter only gets one-third of the current indicated on the meter (galvanometer). Further, great precautions have to be taken to avoid the risk of 'short circuit' and a shock to the patient. Quite a number of deaths have been caused in recent years by these baths: the patient while in the bath lays hold of a gas or water connection, and so forms an earth contact, and receives a very large 'dose' of electricity from the main wire, which has been dammed back by rheostats or resistance wire from the bath. The four-cell electric bath is much to be preferred. It consists of four porcelain or glass vessels, into which the patient places his right and left hands and feet respectively. The current, which may be faradic, galvanic, or combined galvano-faradic, or what is known as a sinuosoidal or wave current, is applied through a special and rather complicated switch; but a great variety of methods of application is available, so that the current can be given in fifty different ways. It may also be applied to the arms alone or the legs alone, and cataphoresis may be employed at the same time—that is, the introduction of drugs such as iodide of potash, and salicylate of soda, and so on, by means of the electrical current. See HYDROTHERAPY, MINERAL WATERS, SWIMMING.

Bath-stone, a building-stone extensively used in England on account of its beauty, is obtained from quarries in the Lower Oolite, in Wiltshire and Somersetshire. It is fine-grained, of a rich cream colour, and is composed of about 94½ per cent. of carbonate of lime, and 2½ per cent. of carbonate of magnesium, but is free from silica. It is easily wrought in the quarry, some beds cutting almost as readily as chalk, and hardens on exposure to the air, but is not very durable. Within twenty-five years after the repaving of Henry VII.'s chapel in Westminster Abbey, with this stone, it had begun to decompose.

Bath'urst, a name applied to various localities in honour of Earl Bathurst, Colonial Secretary (1812–28).—(1) BATHURST in New South Wales, the first county settled beyond the Blue Mountains (q.v.), which were long believed to be impassable. It was not before 1813 that a practicable route was discovered. Bathurst was still further distinguished as the seat of gold-fields, discovered in 1851. The county is bounded on the NE. by the Macquarie, and on the SW. by the Lachlan; it is well watered, and has a moderate temperature. The whole district is admirably suited for agriculture. Mining—principally for gold and copper—is still carried on sporadically. The chief town, Bathurst, on the Macquarie River, 96 miles W. of Sydney, is one of the principal towns in the western district of New South Wales, and is a handsome city with numerous elegant public buildings. Erected into a municipality in 1862, it is connected with Sydney by rail (144 miles), and contains government railway workshops, breweries, tanneries, coach-factories, and flour-mills; soap, candles, glue, and boots and shoes are also manufactured. It is the seat of an Anglican and of a Roman Catholic bishop. Pop. (1891) 9170; (1911) 8575; (1921) 9270.—(2) BATHURST ISLAND, off North Australia, about 12° S. lat., and 130° E. long. It is included in the Territory of North Australia, and is close to the much larger Melville Island, and is partly wooded, partly barren.—(3) BATHURST, the principal settlement of the British colony on the Gambia (q.v.). It is situated on St Mary's Isle, a sand-bank at the mouth of the river. The stores of the European merchants face the river, as well as the government house, barracks, and hospital. Pop. about 9000.—(4) An island in the Arctic Ocean, intersected by the 100th meridian, and situated immediately beyond the 75th parallel.—(5) BATHURST INLET, an arm of the Arctic Ocean, projecting due south for about 75 miles into the North American continent, just touching the Arctic circle and 110° W. long.—(6) A division in the east of the Cape Province, between Port Elizabeth and East London, formed from the district of Albany, contains Port Alfred, Bathurst, and other small towns.

Bath'urst, EARL, a title conferred in 1762 on ALLEN BATHURST (1684–1775), a Tory statesman, and the friend of Pope, Swift, Congreve, Prior, and Sterne. He had been raised to the peerage forty years before as Baron Bathurst.—His son HENRY (1714–94), second earl, sat for Cirencester from 1735 to 1754, and from 1771 to 1778 was Lord Chancellor—'one of the weakest, though one of the worthiest,' that ever sat on the woolsack.—His son HENRY (1762–1834), third earl, was Secretary for the Colonies from 1812 to 1828. To the same family belonged Henry Bathurst (1744–1837), from 1805 Bishop of Norwich, the 'only Liberal bishop' of his day; and his son Benjamin (1784–1809), who disappeared mysteriously between Berlin and Hamburg, as he was travelling with despatches from Vienna.

Bathybius, the name given to a supposed low form of life found at the bottom of some parts of the deep sea, but usually regarded with much scepticism. In 1857, during the explorations connected with laying the Atlantic cable, attention was first directed to the presence at great depths of

a slimy mass which was first described by Professor Huxley in 1868, and called, in honour of Professor Haeckel, *Bathybius haeckelii*. The supposed organism consisted simply of formless masses of slime without any detectable structure, and containing numerous curious limy concretions. In the same year, Sir Wyville Thomson and Professor W. Carpenter had, in the *Porcupine* expedition, opportunity of examining bathybius in its fresh and apparently living state; and in 1870 Haeckel published a more detailed account of this apparently simplest form of life. His description, like that of Huxley, was wholly based, however, on preserved specimens. Apparently simpler than any of the lowest forms of life (*Monera*) which had been previously discovered, bathybius excited great interest. From the results of the *Porcupine* dredging it was expected that this living slime would be found abundantly diffused in the great depths; but this hope was cruelly disappointed. During the prolonged explorations of the *Challenger* (1872–76) the bathybius was not rediscovered. Nor was this all; for Sir John Murray was led to suspect that what had been regarded as living matter was only a gelatinous precipitate of sulphate of lime from sea-water mixed with alcohol. So strong was his suspicion, that he withdrew his previous opinion as to the existence of any such organism. Huxley regarded this step as justified, and also abandoned bathybius to its fate. This instance of the fallibility of modern scientists was not unnaturally taken advantage of by opponents, and made the basis of large assumptions as to the general shakiness of scientific conclusions. Haeckel refused to abandon his namesake, and was apparently justified by the fact that in a later North Polar expedition (1876) Dr Bessels discovered a similar quasi-organism, which he named *Proto-Bathybius*, but which most naturalists regarded as merely the result of the protoplasmic débris of larger protozoa which sink down to the bottom as they die. The case for the existence of such a low form of life, at best doubtful, was found quite insufficient to rebut objections —bathybius is an obsolete hypothesis. See LIFE, MONERA, PROTOZOA, PROTOPLASM, SPONTANEOUS GENERATION, &c.

Bathycles, a Greek sculptor from Magnesia, in Caria, who about the middle of the 6th century B.C. migrated to Sparta, and executed a colossal throne with admirable reliefs, described by Pausanias.

Bathyllus, a freedman and favourite of Mæcenas, born in Alexandria, who as an actor at Rome helped to develop a rude pantomime into regular dramatic art.

Bathym'etry, the art of measuring depths in seas and lakes; see SEA, SOUNDING.

Batignolles, a northern arrondissement of Paris, socially somewhat the equivalent of our Whitechapel.

Batiste, the usual French name for cambric, applied in commerce to a fine texture of linen or cotton. According to Littré, the word is due to the name of the original maker, Baptiste, whose statue is at Cambrai; according to others, to its use in wiping the heads of children after baptism.

Batjan. See MOLUCCAS.

Batlapins, a numerous Bechuana tribe, weakened by war with Matabele and Boers, and now mainly in the Transvaal, near Vryburg.

Batley, a manufacturing town in the West Riding of Yorkshire, 8 miles SW. of Leeds; since 1868 a municipal borough, forming (since 1918) a parliamentary borough with Morley and Ossett. Batley has about 50 mills and factories, being a chief seat of the shoddy and heavy woollen manufactures—army cloths, flushings, pilots, druggets, &c. It has a town-hall (1864–74); an old parish church, Perpendicular in style; some 30 other churches; a free grammar-school (1612; reconstituted 1874); a chamber of commerce; a mechanics' institute; waterworks (1871–78); and a market-house. The population has increased rapidly: (1851) 9308; (1871) 20,871; (1921) 36,151.

Bâtman (Fr. *bât*, 'a pack-saddle'), the soldier-groom of a mounted officer. Every officer in the British army, when doing duty with his regiment, is allowed to employ a soldier as body-servant, and if mounted, a second as groom. These men are struck off all ordinary guards and duties, and receive from the officer a small monthly addition to their pay. On the march and on active service they take their places in the ranks.—*Bât* horses are baggage animals—not chargers.

Batn-el-Hajar ('Womb of Rocks'), a stony district of Nubia, stretching along the Nile in the neighbourhood of the third cataract. The Nile, in the upper portion of the district, is often forced by the approaching rocks into a very narrow channel, and its navigation is frequently interrupted by small islands, rocks, and rapids. The granite hills in some parts attain a height of 2000 feet above the river.

Baton is the name of a short staff, presented by the sovereign to each field-marshal, as the symbol of authority. It is also the name of the long staff carried by the drum-major of an infantry regiment. Baton is also the name of the policeman's truncheon, and of the rod wielded by the conductor of an orchestra. (The French *bâton* originally meant simply a stick.)

Baton Rouge, a city on the east bank of the Mississippi, 129 miles above New Orleans, from 1847 to 1862, and again since 1880, the capital of the state of Louisiana. It was one of the earliest French settlements, and as far back as 1838 was the seat of a college. Baton Rouge contains the state university, agricultural and mechanical college, an asylum for the deaf and dumb and blind, state prison, an elegant state-house, and several churches. The district is very fertile, producing large quantities of cotton, sugar, and maize. Baton Rouge was more than once the scene of important operations during the civil war. It was occupied by Federal troops after the capture of New Orleans, and defended by General Williams, who fell in fighting against the Confederate general Breckinridge, 5th August 1862. Pop. (1920) 21,782.

Baton-sinister, a well-known heraldic indication of illegitimacy. It is a diminutive of a Bend-sinister (see BEND), one-fourth of its width, and couped at the ends—i.e. not extending to the sides of the shield, so as to resemble a marshal's baton or truncheon laid diagonally over the family arms from sinister to dexter. From the 15th century onwards it has been largely assigned in England to the illegitimate issue of the royal family. Heralds say that it may be of metal in the case of bastard descendants of royalty, but in other cases should be of colour, even though placed on colour. In the example represented, the arms of the Duke of Grafton (descended from an illegitimate son of Charles II.), the baton-sinister

Baton-sinister.

is composed of six pieces argent and sable. The terms 'Bar-sinister,' 'Bastard Bar' are often erroneously used for Baton-sinister; the former, for instance, is of frequent occurrence in Thackeray's *Esmond*.

Batrachia. See AMPHIBIA.

Bat'rachomyomach'ia ('the War of the Frogs and the Mice'), a Greek mock-heroic poem, erroneously ascribed to Homer, with whose works it has been generally printed. Pigres of Caria, who lived in the times of the Persian wars, was named amongst the ancients as its author. It is a parody on the *Iliad*, in which the military preparations and contests of beasts, with single combats, intervention of the gods, and other Homeric circumstances, are described with much humour.

Batrachospermum, a genus of algæ classed among the red seaweeds (Florideæ or Rhodophyceæ), though they are greenish, and are confined to fresh water. They form masses of branching threads enclosed in a gelatinous substance. They take their name from their resemblance to frog's eggs.

Bat'rachus. See FROG-FISH.

Batschia, or HUMBOLDTIA, a genus of Leguminosæ (Cæsalpinoideæ), low trees and shrubs, found in Ceylon and Further India. *B.* (or *H.*) *laurifolia* is remarkable for the hollow obconical internodes, three to five inches long, of the flowering branches. A slit forms opposite the insertion of the leaf. This slit is enlarged by small black ants, which take up their abode within, and protect the inflorescence against injurious insects. Branches without flowers are normal.

Batshian. See MOLUCCAS.

Batta, in the British army in India, is an allowance in addition to the ordinary pay of officers. The pay is fixed; but the batta varies according to the part of the country in which the troops are placed, and also depends on the circumstance of their being in the field or in cantonments. If in the field, or more than 200 miles from the presidential government cities, the officers receive full batta; if in garrison, or in cantonment within that distance, half batta. The word is Indo-Portuguese, as old at least as 1548, and most likely originally derived from the Canarese *bhatta*, 'rice in the husk.'

Battalion, an infantry unit for both tactical and administrative purposes. The war-strength of a British battalion is 1000 all ranks, exclusive of 100 left at the base, providing about 850 bayonets at the front. This, approximately, has been adopted as the proper strength of a battalion in all European armies. Its front in line two-deep is about 350 yards, and its length in column of route about 800 yards. The British battalion was reduced in 1912 from 8 to 4 companies, each commanded by a captain (one by a major), with a captain and 4 lieutenants under him. There are 30 officers in all. The whole is commanded by a lieutenant-colonel, who has, as regimental commissioned staff, a major, an adjutant, a quartermaster, or Lewis gun officer, and an officer of Army Medical Corps (see COLONEL, MAJOR, &c.). Some of the bandsmen are trained as stretcher-bearers, and all accompany the unit to the field. There are 17 signallers, 16 stretcher-bearers, 9 sergeants on the battalion staff, and 10 sergeants and 10 corporals per Company (q.v.). A battalion is made up to war-strength, or is 'mobilised,' by eliminating the immature and unfit, and calling up men from the army reserve (see ARMY). Regular battalions are linked territorially in pairs, one of each pair being usually abroad. In Britain 4 battalions constitute a brigade of infantry (see BRIGADE). In most other armies 3 battalions form the tactical and administrative unit called a Regiment (q.v.), and 2 regiments go to make up a brigade.

Battambang, or PHRATABONG, a town of Cambodia, on the Sang Ke, which flows into Tonle Sap, was ceded by Siam to France in 1907; pop. 5000.

Battas, or BATAK, a remarkable race belonging to the Malay stem, inhabiting the part of Sumatra south of Atjeh. Originally spread over the whole northern half of the island, they are now shut in on all sides from the sea, but in the highlands of the interior they have hitherto maintained their individuality. In colour they are light-brown, and have somewhat prominent features and long hair. They work at agriculture and cattle-rearing, and live together in villages, protected by thickets of bamboo stakes. The government is derived from the old Malay form, and is democratic in character. Each village has its raja, but his influence is great only in times of war. The real government is through popular assemblies, in which are often stormy scenes. Polygamy is permitted. The punishment for murderers, prisoners of war, adulterers, spies, and traitors is that they are eaten. Though surrounded by Mohammedans for centuries, the Battas revere the memory of their ancestors, and believe in wicked spirits, and in gods bearing not Malay but Indian names. The arts of reading and writing are widely spread. They possess an alphabet derived from old Indian characters, and a written literature (on bark or bamboo slips)—chiefly books on witchcraft, incantations, riddles, and stories.

Battenberg. The Hessian title Countess of Battenberg (from the small town, now Prussian, of Battenberg, in Hesse-Nassau) was conferred in 1851 on Prince Alexander of Hesse's morganatic wife, the Russian Polish Countess Julia Theresa von Hauke (1825–95); and in 1858 she was made a princess. Fruits of that union were Prince Louis Alexander, Prince Alexander, and Prince Henry.

Prince Louis Alexander, born at Gratz, 24th May 1854, became naturalised, and entered the British navy in 1868. He married his cousin, Victoria, eldest daughter of Princess Alice (Queen Victoria's daughter), in 1884. Made a rear-admiral in 1904, he became First Sea Lord of the Admiralty in 1912, but resigned in 1914, when prejudice had been aroused against his birth. In 1917, at the king's request, he relinquished his German titles, assumed the surname of Mountbatten, and became a peer of the United Kingdom, with the title of Marquess of Milford Haven. Raised to the rank of Admiral of the Fleet in August 1921, he died on the 11th of September. He wrote a book on medals (1921).

Prince Alexander, born in 1857, chosen prince of Bulgaria in 1879, proclaimed the union of Eastern Rumelia with Bulgaria (1885) without consulting Russia, and thereby also provoked the jealousy of the Serbs, whom he defeated in a fortnight's campaign. But in August 1886 partisans of Russia overpowered him in his palace at Sofia, forced him to abdicate, and carried him off to Reni, in Russian territory. Set free in a few days, he returned; but after a futile attempt to conciliate the Tsar, he abdicated finally next month, and assuming the title of Count Hartenau, retired to Darmstadt. He died 17th February 1893. See BULGARIA.

Prince Henry, born at Milan, 5th October 1858, died at sea of fever caught in the Ashanti war, 20th January 1896. In 1885 he married the Princess Beatrice (born 14th April 1857), youngest daughter of Queen Victoria.

Battens, sawn fir timber, of smaller dimensions than the kind called planks. They are usually from 12 to 14 feet long, 7 inches broad, and 2½ inches thick. Cut into two boards, each 1¼ inch thick, they are used for flooring; cut into three

boards, they are put on roofs below slates; in narrower pieces, they are put upright on walls for fixing the laths for plastering. The best battens are brought from Norway, and sold wholesale by wood-merchants.

Batter, in architecture, used as a noun and as a verb to express the manner in which walls, as those of towers, slope inwards. The walls of wharfs, and those built to support embankments and the like, usually batter.

Battering-ram, an engine of war used in ancient and medieval times. It consisted of a beam of wood, with a mass of bronze or iron on one end, resembling the head of a ram (Lat. *aries*). In its simplest form, it was borne and impelled by the hands of the soldiers; afterwards, it was suspended in a frame, and made to swing. Another form moved on rollers. The alternating motion was communicated by ropes. To protect those working it, a wooden roof (*testudo*) was constructed over it, and the whole was mounted on wheels. The beam of the ram varied from 60 to 120 feet in length, the head sometimes weighed above a ton, and as many as 100 men were employed in impelling the machine. When the blows were long enough continued, hardly any wall could resist. The Romans derived it from the Greeks. A battering-ram was used in Irish evictions in 1889–90.

Battersea, a metropolitan borough, on the Surrey side of the Thames, here crossed by the Chelsea, Albert, and Battersea bridges. In the parish church (1777) is a monument to the celebrated Lord Bolingbroke, who was born and died in a house close by. In Battersea Fields the Duke of Wellington fought a duel with Lord Winchelsea (1829). Battersea Park, 185 acres in area, was laid out in 1852–58; and the Albert Palace was opened in 1885. In 1899 Battersea became a metropolitan borough. The parliamentary borough (with two members) coincides, since 1918, with the metropolitan borough. Pop. 168,000.

Battery, a group of guns, whether field or siege, under the command of one immediate superior. A field or horse battery has 6 guns in all modern armies except the Russian, in which it has 8; but some armies are contemplating the reduction to 4 pieces, owing to the great power and rapidity of fire of the newest weapons. The term battery includes men, horses, and everything that takes the field as a unit; but is also used to designate the *personnel* only (see ARTILLERY). A fortified emplacement for guns is also called a battery. In foreign armies, garrison artillery are divided into battalions and companies; with us, into companies. These companies provide the *personnel* for certain types of battery (see BRIGADE, ARTILLERY). Batteries are divided into sections of 2 guns each, commanded by a subaltern. The captain has charge of the ammunition supply to the guns, and the battery is commanded by a major. (For *personnel*, &c., of the chief types of battery, see ARTILLERY.) About 50 rank and file per battery are armed with rifles, but have no bayonets. In the horse artillery all wear swords except 'drivers;' in the field artillery only officers and warrant-officers wear swords; in garrison artillery the gunners have rifles and short bayonets. In addition to the ammunition and the arms of the men, every horse and field battery also carries spare sights and other parts, fuses, tools, and small articles, besides stores for the artificers. When guns are grouped for siege purposes, they are placed in specially prepared works, fitted with platforms and provided with magazines. There are two types, the pit and the epaulment battery, the latter having the gun-wheels on the level of the natural ground. Each has a variety of forms, and is provided with thick earth cover in front and on a dangerous flank, traverses between guns to localise the effect of a shell-burst, overhead cover of beams and earth for magazines and stores and unemployed *personnel*, covered passages from gun to gun and from battery to battery. Concealment is, in modern warfare, reckoned of almost paramount importance, and emplacements are often sited on reverse slopes of hills, a score or more of feet below the intervening crest, so that even the flash of the discharge is invisible to the enemy; and, the powder being smokeless, the concealment is complete. When this kind of concealment is impracticable, various artifices are employed in screening. For electric batteries, see ELECTRICITY, DYNAMO-ELECTRIC MACHINES; for assault and battery, see ASSAULT.

Batthyanyi, one of the most powerful families of Hungary, traces its origin back to the Magyar invasion in 884 A.D., and has given to Hungary many distinguished warriors, statesmen, and churchmen.—Francis Batthyanyi distinguished himself at the battle of Mohacs in 1526; Balthazar fought with distinction in the Turkish wars of the 16th century.—Count Casimir (1807–54) was Minister of Foreign Affairs in Hungary during the insurrection in 1849, as well as military governor. After the catastrophe he fled with Kossuth into Turkish territory, whence in 1851 he went to France.—Count Louis (1809–49), belonging to another branch of the family, espoused the national cause, yet sought to maintain the connection with Austria and his allegiance to the Austrian sovereign. Appointed President of the Ministry in March 1848, he did not hold the office long, and afterwards, as a member of the diet, acted with great moderation. Yet after the Austrians entered Pesth, he was arrested and executed by sentence of martial law. His estates, valued at £400,000, were confiscated, but restored to his family in 1867; and in 1870 his body was removed and interred anew.—A Prince Batthyanyi (1803–83) occupied for forty-five years a prominent position on the turf, winning the Derby in 1876.

Battle, a town in Sussex, 6 miles NW. of Hastings, consists of one street. The uninhabited heathland of Senlac was renamed from the Battle of Hastings (q.v.), fought here on 14th October 1066. William, to commemorate his victory, founded in 1067, on the spot where Harold fell, a splendid Benedictine abbey. The probably fabulous roll of the Conqueror's barons deposited in it was said to have perished in the burning of Cowdray House in 1793; and the ten 'copies' extant have all been grossly tampered with. Pop. 3000.

Battle (Fr. *bataille*, akin to *battre*, 'to beat'), a hostile encounter or combat between opposing forces, whether on land or sea. In military operations the *battle* is the culminating effort of all the previous strategy, and the aim of a commander is to have available at this moment as much as possible of his own army against inferior strength of the enemy. If it is recognised that the enemy has entrenched, and intends to await attack, caution can be exercised by opening the engagements with tentative attacks along the front by comparatively small bodies of troops, but with supports and reserves of all arms as close up as is consistent with concealment. This action, though the commencement of the battle, is of the nature of a final reconnaissance, calculated to lay bare the shape of the enemy's dispositions, in order that the commander may use his masses in full knowledge. He will endeavour to retain the initiative by a continuous impulsion, and by striking his final and decisive blow in a direction and with numbers that will come as a surprise to the enemy. To accept battle on the defensive is usually an acknowledg-

ment of temporary inferiority, whether of quality or numbers. For the moment the defender renders himself, by skilful dispositions and entrenchment, the equal of the superior enemy, but cannot hope for decisive success in the campaign without becoming eventually the attacker. The latter has the advantage, material and moral, of having a definite plan, while the defender is largely confined to parrying blows. The attacker also, winning substantially at a single point, either has the victory or is on the road to it; the defender must be successful everywhere. In the infrequent 'encounter' battle, when both sides open by attack, quickness of decision is all-important.

Success in battle, apart from the value of numbers and of quality in the commander, depends on the *moral* of the troops, their state of tactical training, their physical condition, their confidence in their officers, the quality of their armament, the ability of the staff, and the continuous co-operation of all the arms and of all the units. In this co-operation the mutual relation of infantry and artillery is held in these days to be of supreme importance, and is assiduously studied in all modern armies. See STRATEGY, TACTICS, WAR.

For the tactics of sea-battles of the future, some guidance can be had from the combat of Tsushima in 1905 (Russia and Japan). The heaviest guns, the best gunnery, and tactics that brings one's gunners into the best light will win—this is the experience of the Great War, from battles of Jutland and Coronel and Falklands, abstraction being made of the spirit of chiefs and crews.

In the matter of casualties, eleven of Frederick the Great's battles showed an average of 14 per cent. In earlier battles, mostly of hand-to-hand character, casualties were apt to be very high. Until the Great War, their percentages seemed to be decreasing. Napoleon's battles showed great variety in this connection, from 8 per cent. at Bautzen (1813) to 24 at Waterloo and 28 at the Borodino. The Secession War in America (1861–65) showed high figures, while Sadowa and Gravelotte showed only 6 and 9 respectively. In the Great War battles were so like campaigns that comparative figures are hardly possible.

In most of these battles the fighting lasted only one day; the war in Manchuria (1904–5) showed that future great battles were more likely to last a week if, of two fairly equal enemies, one entrenched seriously. At Mukden, with over 400,000 on each side, there was continuous fighting for fourteen days and nights, the Russians suffering a loss of 140,000, *plus* 40,000 prisoners, or nearly 30 per cent. without prisoners; but the daily losses were only about 2 per cent. Eighty per cent. were hurt by machine-gun and rifle fire, 15 per cent. by artillery, 5 per cent. by cold steel, in modern battles, but in the Great War the artillery and the bayonet had higher figures. In the Great War the duration of battles took a leap upwards, so that some historians prefer to use the word campaigns. Thus the battle of Verdun, begun on 21st February 1916, only ended 5 months later, including the French counter-attacks at the end. In 1851—the year that was to inaugurate a universal peace—Sir Edward Creasy published *The Fifteen Decisive Battles of the World*, a title from which the emphatic 'The' might have well been omitted. His list is as follows: Marathon (490 B.C.), Syracuse (413 B.C.), Arbela (331 B.C.), Metaurus (207 B.C.), defeat of Varus (9 A.D.), Châlons (451), Tours (732), Hastings (1066), Orleans (1429), defeat of Spanish Armada (1588), Blenheim (1704), Pultowa (1709), Saratoga (1777), Valmy (1792), and Waterloo (1815). Actium (31 B.C.), Lepanto (1571), and Trafalgar (1805) might fairly have been included in the list; to which should be added Sadowa (1866), Sedan (1870), and perhaps Mukden (1905). In the Great War the battles that decided phases on the Western front were: 1st Marne (Sept. 1914); 1st Ypres (Nov. 1914); 2d Ypres (April 1915); Verdun (Feb. 1916); 2d Marne (July 1918); 2d Somme (8th Aug. 1918); Cambrai (Sept. 1918).

Battle, WAGER OF. The Wager of Battle, or as it is sometimes called, Trial by Combat, was an ancient usage in English law which permitted the accused and accuser, in defect of sufficient direct evidence, to challenge each other to mortal combat, for issue of the dispute. It obtained in civil and criminal cases, and also in military matters, to which, indeed, it was more appropriate. It consisted of a personal combat between the parties in presence of the court itself, and was grounded on the idea of an appeal to Providence, the expectation being that Heaven would give the victory to the innocent or injured party.

In charges of treason, the wager of battle was occasionally resorted to. 'It seemeth,' says Coke, 'that by the ancient common law one accuser or witness was not sufficient to convict any person of high treason; for in that case, where is but one accuser, it shall be tried before the constable or marshal by combat, as by many records appeareth.' The court over which the constable or marshal presided was called the Court of Chivalry. When the Earl-marshal sat alone, it was a military court, or court of honour; when the Lord High Constable and the court sat conjointly, it was also a criminal court. The form and manner of waging battle in cases of treason were very elaborate, and attended by imposing ceremonies. (A full account of these will be found in Blackstone's *Commentaries*, book iv.) In *Richard II.* (I. iii.), in the quarrel between Norfolk and Bolingbroke, Shakespeare has preserved a perpetual record of this chivalrous solemnity.

In civil cases, the battle was waged by champions, and not by the parties themselves; but in criminal cases, the parties fought in person, unless the appellor were a woman, a priest, an infant, or a man of the age of sixty, or lame, or blind, all of whom might refuse the wager of battle, and compel a trial by jury. Commoners could not challenge peers of the realm to wage battle, on account of their personal dignity, nor, by special charter, could the citizens of London engage in trial by combat, fighting being considered foreign to their education and employment. Whether by champions or in person, the mode of proceeding was the same. The appellee, or defendant, as he might be called, threw down his glove, and declared that he would prove his right, or defend himself with his body. The appellor, or prosecutor, in accepting the challenge, took up the glove, and replied that he was ready to make good his appeal, body for body; and thereupon the parties, holding each other's hands, joined issue before the court in a very formal and solemn manner. The combatants were obliged to swear that neither of them would resort to sorcery or witchcraft. The battle might last till the stars appeared in the evening, and the party who by that time had either killed or got the better of his opponent, was considered the successful suitor of justice. In a charge of murder, if the accused was slain, it was taken as proof of his guilt, and his blood was attainted; if he was so far vanquished as not to be able or willing to fight any longer, he was adjudged guilty, and sentenced to be hanged immediately.

So late as the year 1818, this barbarous procedure was solemnly decided by the Court of King's Bench to be a valid and legal mode of trial, which the king's subjects were free to adopt. Of course, the principle was, that all laws, no matter how

unsuitable to the times, could be enforced, unless expressly repealed by act of parliament. The case is that of Ashford *v.* Thornton, and is reported in the first volume of Barnwall and Alderson's *Reports*, p. 405. As we have stated, the court decided in favour of the validity of the ordeal, one of the judges remarking that enough had not been stated to induce their lordships to refuse the battle, and another more plainly and unequivocally observed that the defendant was 'entitled to this his *lawful* mode of trial.' But Lord Ellenborough put the matter more clearly by stating that 'the general law of the land is in favour of the wager of battle, and it is our duty to pronounce the law as it is, and not as we may wish it to be; whatever prejudices, therefore, may justly exist against this mode of trial, still, as it is the law of the land, the court must pronounce judgment for it.' In this case, the man at the bar was charged with murder; and he threw down the glove in token that he challenged his accuser. The latter individual, however, declined, under legal advice, to take up the glove, and so the charge was departed from. In consequence of this case, the Act 59 Geo. III. chap. 46 was passed, by which the ordeal was wholly abolished.

In Scotland, the matter would have been differently disposed of; for the judges there, following the doctrine of the Roman law, would have held the proceeding to have been in desuetude and obsolete, and there the matter would have ended.

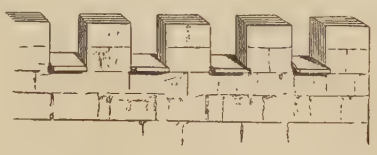
Montesquieu, in his *Spirit of Laws*, book xxviii., very ingeniously and plausibly deduces the modern practice of duelling and the so-called laws of honour from the above form of judicial combat. See ORDEAL; and Geo. Neilson, *Trial by Combat* (1890).

Battle-axe was a weapon much used by the early northern nations, Celtic and Scandinavian, requiring great strength in its use. Some were held with one hand, some with two; the former kind could be wielded equally by horse and foot, but the latter was for foot-soldiers only. The battle-axe had a longer handle, and a broader, stronger, and sharper blade than the common axe. During the middle ages, and somewhat earlier, it was much used in sorties, and to prevent the escalading of a besieged fortress. The *pole-axe* differed but little from the battle-axe. The *black bill* and *brown bill* resembled a halbert, having the cutting part hooked like a woodman's bill, with a spike projecting from the back, and another from the head. *Glaive*, usually a sword, was sometimes applied to a kind of pole-axe or bill used by the Welsh. The *francisca* of the Franks was hurled as a missile. See HALBERT, LOCHABER AXE.

Battle Creek, a thriving city of Michigan, on the Kalamazoo River, and at the junction of several railways, 45 miles SW. of Lansing. It is the headquarters of the Seventh-Day Adventists, and manufactures machines and agricultural implements. Pop. 36,000.

Battleford, a town of Saskatchewan Province, Canada, is situated at the junction of the Battle River with the Saskatchewan, and connected by rail with Winnipeg and the Canadian Pacific Railway at Calgary. The capital of the North-west Territories from 1876 to 1883, it lost importance and population when the seat of government was transferred to Regina; but it remains the prosperous centre of a fertile farming district. Pop. 1200.

Battlement (Fr. *bâtiment*, 'building'), a notched or indented parapet formed by a series of rising parts called *cops* or *merlons*, separated by embrasures or openings called *crenelles*. Battlements were intended to enable the soldier to shelter himself behind the merlon, whilst he shot through the embrasure. Originally military, they became freely used for architectural effect in other



Simple form of Battlement.

buildings. In churches, the battlements are frequently pierced with circles or trefoils.

Battleship. See NAVY.

Battue (from Fr. *battre*, 'to beat'), a word less used by real sportsmen than by writers on sport. The battue is a method of killing game on a great scale, by causing animals to be driven forward to a point where a number of guns are posted. The driving is effected by beating the bushes; hence the term battue. The word occurs in a letter of Matthew Gregory Lewis in 1804; but, according to Cobden, the battue was unknown in 1790. Certainly, as it is practised to-day, it is quite modern; though a plan of killing deer by driving them forward in herds in an ever-narrowing circle to a place where they are to be shot is an old usage in the Highlands, where it is called the *tinchel* (Gael. *timchioll*, 'circuit'). It is practised chiefly in extensive preserves of pheasants and hares during the autumn and winter months, when country gentlemen invite acquaintances to their houses for the sake of field-sports. The battue takes place early in the day; the number of men is usually eight or ten, each provided with at least two guns, which are loaded by an assistant as soon as they are discharged. When the guns are stationed at safe distances from each other, and ready to commence work, the beaters begin theirs by driving the game before them. Sometimes, however, pheasants will run a long way before taking to the wing, and to make them rise on approaching the guns a low net is occasionally stretched across their path. It should be stated, however, that in the battue, hares, rabbits, &c. are shot as readily as pheasants; and at length the ground is covered with slain, like a field of battle. Big bags date from 1860, the first to startle the shooting world in this respect being the Maharaja Dhuleep Singh, then of Elveden Hall, Suffolk.

Battus, according to legend the founder of the Greek colony of Cyrene in Libya (*c.* 630 B.C.), a native of Thera.

Batu, a group of islands in the Netherlands Indies, off the W. coast of Sumatra.

Batum', or BATOUM', a town of Transcaucasia, on the eastern shore of the Black Sea, 201 miles W. of Tiflis, and 575 of Baku, by a railway completed in 1883, is capital of the Adshar autonomous republic in Georgia. Batum was founded as Petra by one of Justinian's generals early in the 6th century A.D., and figures as Vati in the middle ages. The Berlin Congress of 1878, in sanctioning its cession by Turkey to Russia, stipulated that it should not be made into a naval station. None the less the Russians rendered it a second Sebastopol, and in 1886 withdrew its privileges as a free port. In 1918 it was ceded to Turkey, occupied by British troops till 1920, and in 1921 ceded to Georgia, under condition of autonomy. The harbour is one of the best on the east coast of the Black Sea. A pipe-line carries oil from Baku; among other exports is manganese ore. The place has been vastly improved since 1878. The marshy country around it has been drained. Pop. 32,000.

Batuta. See IBN BATUTA.

Batz, BARON DE, an audacious royalist, who under the revolution plotted to carry off the king and to rescue the queen, corrupted members of the Convention, and created universal fear of foreign intrigue. In 1815 he was nominated a field-marshal, and he died in 1819. See a book by Lenôtre (1910).

Baucis. See PHILEMON.

Baudelaire, CHARLES, born at Paris on the 21st April 1821, after a voyage to India became a notable figure in the second group of Romantic poets who carried on the movement begun by the Romanticists of 1830. His *Fleurs du Mal*, a volume of poems issued in 1857, was the subject of a prosecution on the score of immorality, and had to undergo expurgation. He afterwards published *Les Paradis artificiels, Opium et Haschisch*, a work partly original, partly composed of selections, admirably translated, from Poe and De Quincey. His occasional essays, collected in *L'Art romantique*, are remarkable for the finish of the style and the subtlety of the criticism. Apart from his verse, however, Baudelaire's finest work is contained in his fifty *Petits Poëmes en Prose*. All of these are exquisitely written, and in many of them the beauty of the thought is equal to the beauty of the language. Financially ruined and stricken with paralysis, the penalty of excess, Baudelaire died in Paris 31st August 1867. He was neither a prolific nor a popular writer, and he too often misapplied his incisive intellect to repulsive subjects. He united a remarkably keen analytic faculty with a powerful, sombre imagination. Brooding melancholy, curiously tinctured with irony, inspires the solemn music and dream-like imagery of his best verses. He was the 'father' of the decadent symbolist school.

See his *Œuvres Complètes* (7 vols. 1868–70) and *Œuvres Posthumes* (1908); Henry James's *French Poets and Novelists* (1882); and monographs by Gautier (1903), Crépet (1887; enlarged 1919), Séché (1910), Tournachon (1911), Nadar (1911), Turquet Milnes (1913), and Symons (1921); T. Gautier's Life (trans. 1915).

Baudry, PAUL (1828-86), a French painter, was born at La Roche-sur-Yon, and studied in Paris and Rome. Among his best-known works are 'Punishment of a Vestal Virgin' (1857) and the 'Assassination of Marat' (1867). He was for ten years employed in decorating the *foyer* of the Grand Opéra in Paris. See J. C. Van Dyke, *Modern French Masters* (1896).

Bauer, BRUNO, biblical critic, was born at Eisenberg, in Saxe-Altenburg, 9th September 1809. After his studies at Berlin, he became a *privatdocent* in the university there, and in 1839 at Bonn; but three years later he was forbidden to deliver any more theological lectures. He then removed to Berlin, and busied himself there with incessant writing of a more or less violent and polemical description on theological and political subjects, until his death at Rixdorf, near Berlin, 13th April 1882. At first an adherent of the young Hegelian school, Bauer in his earlier works explained the Christian religion as substantial truth obscured by the accretions of a confused and erroneous system of interpretation. In his books on John and the Synoptic Gospels, published in 1840–42, he maintained that the gospels were in no sense historical, but merely artistic products of the human self-consciousness. These books brought him into embittered controversies, which impelled him to retorts that were often both violent and vulgar. His pamphlet against the emancipation of the Jews, in 1843, marked the beginning of a reaction against liberalism, and from this time he abandoned theology for some years, and employed himself as a publicist and littérateur. He wrote numerous historical works on the 18th century, in which he tries to show that the failure of the popular and national struggles in the 19th century was a result of the essential weakness of the 'enlightenment' of the 18th. Later he returned to his earlier studies, and alternated books of destructive criticism on the gospels, the Acts of the Apostles, and the Pauline epistles, with defences of Prussian conservatism. His latest work, published in the year of his death, contrasted the imperialism of Disraeli and Bismarck. See A. Schweitzer, *Quest of the Historic Jesus* (trans. 1910).

Bauer, CAROLINE, a German actress, born at Heidelberg in 1807, made her début in 1822, and had achieved a brilliant success, in comedy and tragedy alike, when in 1829 she married Prince Leopold, afterwards king of the Belgians. Their morganatic union was as brief as it was unhappy; in 1831 she returned to the stage, which she quitted only in 1844, on her marriage to a Polish count. She died at Zürich, 18th October 1878. Her posthumous Memoirs (Eng. trans. 1884), with their denunciations of Prince Leopold and Baron Stockmar, offer a striking contrast to the two bright volumes of theatrical reminiscences that had preceded them in 1871 and 1875.

Bauhin'ia, a genus of Leguminosæ, sub-family Cæsalpinioideæ. The leaves are generally divided into two lobes, which led Plumier to name this genus in memory of the united labours of the brothers John and Caspar Bauhin, two botanists of the early part of the 17th century. The species are natives of the warmer regions of both hemispheres, and some of them are remarkable for the size and beauty of their flowers. Most of them are twining plants, or *lianas*, stretching from tree to tree in the tropical forests, such as *B. Vahlii*, the Maloo Climber of India, which may attain a length of 300 feet, at once smothering the highest tree-tops and strangling the stems below; but some are small trees, as *B. porrecta*, the Mountain Ebony of Jamaica, so called from the colour of its wood. The inner bark of several East Indian species is employed for making ropes; that of the Maloo Climber being employed for making suspension bridges on account of its extreme toughness. *B. retusa* and *B. emarginata*, also East Indian, exude a brownish coloured mild gum; whilst the astringent bark of *B. variegata* is used in Malabar for tanning and dyeing leather, and also in medicine; it also yields an ebony. The leaves of various species are used in Brazil as demulcent medicines, having mucilaginous properties.—Livingstone mentions a species of bauhinia in South Africa, called the Mopané Tree. It is remarkable for the little shade which its leaves afford. They fold together, and stand nearly erect during the heat of the day. On them the larvæ of a species of *Psylla* cause a saccharine secretion, in circular patches, beneath which the pupa of the insect is found. The natives scrape it off, and eat it as a dainty.

Baumgarten, ALEXANDER GOTTLIEB, a clear and acute thinker of the school of Wolf, was born at Berlin on the 17th of July 1714, studied at Halle, and in 1740 became professor of Philosophy at Frankfort-on-the-Oder, where he died on the 26th of May 1762. He is the founder of Æsthetics (q.v.) as a systematic science of the beautiful and an integral part of philosophy. In 1750–58 he issued two volumes of his *Æsthetica*, but his death hindered the completion of the work. His writings in other departments of philosophy are marked by clearness and precision. He carried the dogmatic, rationalistic system of Wolf to its utmost development; his *Metaphysica* (Halle, 1739; 7th ed. 1779) is one of the most useful books for the study of the Wolfian philosophy. He also wrote *Philo-*

sophia Generalis (published 1770), *Ethica* (1740), *Jus Naturæ* (1765). See Joh. Schmidt's *Leibnitz und Baumgarten* (Halle, 1874).

Baumgarten-Crusius, LUDWIG FRIEDRICH OTTO, a German theologian, born at Merseburg, 1788. He studied theology at Leipzig, became in 1810 university preacher there, and in 1817 professor of Theology at Jena, where he died, May 31, 1843. As a theologian, he showed a semi-rationalistic tendency, from which, however, he was saved by a yet more powerful influence—a spiritual affinity with Schleiermacher. His best work is in the region of the history of dogma. His chief works are *Lehrbuch der Christlichen Sittenlehre* (1827), *Lehrbuch der Christlichen Dogmengeschichte* (2 vols. 1831–32), *Kompendium der Christlichen Dogmengeschichte* (2 vols. 1840-46), the last—completed from his notes by Hase—perhaps his best book.

Baur, FERDINAND CHRISTIAN, was one of the most eminent and influential of modern German theologians. It has not unjustly been said of him that he was for the criticism of the New Testament what Wolf and Niebuhr were for classical literature and history. Baur was born at Schmiden, near Stuttgart, on the 21st June 1792, became professor in the theological seminary at Blaubeuren in 1817, and was called to the university of Tübingen as professor of Theology in 1826. In his work here he spent a most laborious life, being known as the founder of the 'Tübingen School;' and at Tübingen he died 2d December 1860.

His first publication, *Symbolik und Mythologie* (1825), expounded the nature-religion of antiquity; but the main work of his life lay in the fields of church history, the history of Christian dogma, and biblical criticism. Originally a disciple of Schleiermacher, he early attached himself to the school of Hegel, and the Hegelian conception of history he in the main continued to hold from the time he published his books on Manichæism (1831) and Gnosticism (1835) till the end of his life. Of much greater importance than these were his elaborate works on *The Christian Doctrine of the Atonement* (1838) and the *Trinity and Incarnation* (1843). The *Handbook of the History of Christian Dogma* was followed by three volumes of *Lectures* on the same subject. His famous *Contrast between Catholicism and Protestantism* (1836) was written in reply to the *Symbolik* of the Catholic theologian, Möhler.

Baur's article on the 'Christ-party in the Corinthian Church,' contributed to the *Tübinger Zeitschrift* for 1831, may be said to have first indicated that conception of the early Christian Church with which his name is identified, and which in a long series of works he has compelled all subsequent writers on this period either to accept in whole or in part, or explicitly to refute. The current view of the early church was that in it peace, concord, and unity prevailed. But from a careful study of the New Testament and patristic literature, Baur came to a different conclusion. The most ancient Christianity, it seemed to him, stood very near to Judaism, the Christianity of the congregation in Jerusalem and the apostles there. Paul was the first to free the new faith from this narrowness, but the majority of the Jewish Christians and the apostles were unable to adopt Paul's wider view of the scope and mission of Christianity, and opposed it at times with passionate hostility. The Judaistic or Ebionite party long maintained the supremacy in the church, their creed differing from Judaism mainly in the belief that Jesus was the Messiah, and it was not till long after Paul's death, and mainly during the Gnostic controversies about or after the middle of the 2d century, that the contending parties were welded together into the Catholic Church, by help of the dogmatic system of the fourth gospel, and the episcopal constitution of the church. The various stages of the process of fusion are, in Baur's belief, marked by extant documents, both amongst the books of the New Testament and in extra-canonical literature. Most of the New Testament books Baur held to have been written in the 2d century. Of Paul's epistles he accepted as genuine only those to the Romans, Corinthians (I. and II.), and Galatians; and only these genuine epistles of Paul, and the Apocalypse representing the opposite or Judaistic extreme, seemed to Baur to have been written before the year 70 A.D. The Acts of the Apostles minimised the hostilities that rent the early church, and the highest outcome of the conciliating tendency was the Gospel of John, which was of course not by the apostle, but by a writer of the 2d century. These views are developed with vast learning, ingenuity, and brilliancy of criticism in *Paul, the Apostle of Jesus Christ* (2d ed. 1867; Eng. trans. 1873–75); *Critical Investigations on the Canonical Gospels;* the *Gospel of Mark;* and *Christianity and the Christian Church of the first Three Centuries* (3d ed. 1863; Eng. trans. 1879). The later periods of church history Baur treated in four separate works—on the church from the 4th to the end of the 6th century; the church of the middle ages; the church of modern times; and the church of the 19th century. The most distinguished of those who adopted Baur's view of the early church of the leaders of the Tübingen School were Zeller, Schwegler, Köstlin, and Hilgenfeld, their principal organ being the *Theologische Jahrbücher* (published from 1842 to 1857). But Baur's disciples were very numerous, and his influence was marked on many who could not be said to belong to the school. Many of the contentions of Baur and his earlier followers have been modified by the later representatives of Baur's view; but of the school as a whole, it may be said that its leaders were the first to bring to bear on the doctrine, constitution, and literature of the early church the strict scientific methods adopted by dispassionate workers in other departments of historical research. It should be noted that Baur's main position was to some extent anticipated by Semler, and also by the English deists, Thomas Morgan and John Toland.

See R. Mackay's *Tübingen School* (1863), Zeller's *Vorträge und Abhandlungen* (2d ed. 1875), and Schmidt and Haussleiter on Baur in the Hauck-Herzog *Realencyklopädie* (1896–1909).

Bautain, LOUIS EUGÈNE-MARIE, a French philosopher and theologian, born at Paris, February 17, 1796. A pupil of Cousin, he became in 1816 professor of Philosophy in the College of Strasburg. He took orders in 1828, but was much harassed by charges of heterodoxy discovered in his writings, and at one time was even suspended from his sacred function for some years. In 1848 he was appointed vicar-general of the diocese of Paris, and in 1853 a professor of the Theological Faculty. He died at Paris 18th October 1867. Besides being a very popular preacher, he wrote several philosophical books, among them *Psychologie Expérimentale* (1839), *Philosophie Morale* (1842), *La Religion et la Liberté* (1848), *La Morale de l'Évangile* (1855), and *Philosophie des Lois* (1860).

Bautzen (Wendish *Budissin*), an important manufacturing town in Saxony, situated on a rising ground overlooking the river Spree, 35 miles W. of Görlitz by rail. It is the chief town of an administrative district of the same name, which has a population of 461,000, including some 50,000 *Wends*, remnants of the old Slavic population of

eastern Germany. The chief buildings are a former cathedral (1497), and the castle of Ortenburg, dating from 958, and a frequent residence of the kings of Bohemia. The leading industries are manufactures of woollens, fustian, linen, hosiery, leather, and explosives. Pop. 40,000. Bautzen was first made a town under Otho I. It suffered greatly in the war with the Hussites, and still more during the Thirty Years' War. Here Napoleon, after an obstinate resistance, won a barren victory over Russians and Prussians, May 20–21, 1813.

Bauxite, the principal ore of Aluminium (q.v.), is so named from Les Baux, near Arles, where it was first found. It is a hydrous oxide ($Al_2O_3\ 2H_2O$) generally with oxide of iron, white, brown, or red, occurring in earthy or concretionary masses in northern France, the United States, British Guiana, Ireland, and elsewhere. See BRICKS.

Bava'ria (Ger. *Bayern*), second in area and population of the states of the German commonwealth, is divided into two unequal parts, the Palatinate (Rheinpfalz) being separated by Baden and Hesse from the rest of the state, which is surrounded by Prussia, Thuringia, Saxony, Bohemia, Upper Austria, Salzburg, Tirol, Vorarlberg, Württemberg, Baden, and Hesse. Bavaria is divided into eight districts, as follows:

Districts.	Area in sq. miles.	Pop. in 1925.
Upper Bavaria	6439	1,684,766
Lower Bavaria	4148	755,769
Palatinate	2288	931,755
Upper Palatinate	3727	629,262
Upper Franconia	2910	757,515
Middle Franconia	2930	998,386
Lower Franconia	3252	762,744
Swabia and Neuburg	3804	859,397
Total	29,498	7,379,594

This table includes under Upper Franconia the Coburg territory, and under Lower Franconia the Königsberg territory, of the free state of Coburg, which united with Bavaria in 1920. 160 sq. miles of the Palatinate (with 96,000 inhabitants) came under the Saar basin administration in 1919. Munich, the capital, has 681,000 inhabitants, Nürnberg 392,000, Augsburg over 165,000.

Bavaria is walled in on S. and NE. by mountains (Bavarian Alps, Böhmerwald, Fichtelwald, and Frankenwald), ranging from 3000 feet to close on 10,000 feet in height. The Zugspitze of the Noric Alps (9730 feet) is the highest peak in Germany. The interior is intersected in several directions by various less elevated ranges, alternating with extensive plains and fertile valleys. One-third of the country is covered with forests, mostly pine and fir.

The Rhine flows along the eastern boundary of the Palatinate. The Danube enters Bavaria proper at Ulm, and passes out at Passau into Austria. Including its windings, the length of the Danube in Bavaria is about 270 miles, which can be navigated throughout. The north part of the state is in the basin of the Main. In the south are many beautiful lakes—Ammer See, Starnberger See, Walchen See, Tegern See, Chiem See, Königs See, &c. The lakes and rivers abound in fish. The *Ludwigs-Kanal* unites the Main and Altmühl, and through them the Rhine and Danube, and so the German Ocean with the Black Sea.

Climate, Soil, Products, &c.—The temperature of Bavaria varies considerably, but the climate may be described generally as mild and salubrious. The soil is very fertile, and the wealth of the country consists almost wholly of its agricultural produce. The chief crops are hay and other fodder, rye, oats, barley, wheat, and potatoes. The land is mostly cultivated by peasant proprietors. The plain south of Munich has been described as the granary of Germany, while the districts of Upper and Middle Franconia are styled the hop-garden of Bavaria. The vine is cultivated extensively in Rheinpfalz and Lower Franconia, and the wine is held in great esteem. The quantity annually produced in Bavaria is estimated at 15,000,000 to 16,000,000 gallons. Cattle-rearing forms the exclusive occupation of the inhabitants on the slopes and at the foot of the Alps. The forests of Bavaria annually furnish large quantities of timber. The chief minerals are salt, coal, and iron, which is worked almost everywhere throughout the territory.

Manufactures, &c.—The manufacture of beer is carried to great perfection in Bavaria, and to an extent unparalleled in Europe. Nearly two-thirds of the revenue of the state used to be derived from this source alone, which belongs now to the central government. Other industries are concentrated at Nürnberg, Augsburg, and the Palatinate towns, the chief manufactures being coarse linens and woollens, silk, ribbons, china and glass, shoes, gloves, iron goods, firearms, toys, paper, articles of straw and wood, nails, needles, jewellery, chemicals, beetroot, sugar, and tobacco. The mathematical, optical, and musical instruments of Munich are held in high repute. The position of Bavaria gives it a large transit-trade.

Population.—The population of Bavaria has increased more slowly than that of other German states, thanks largely to an old law that no marriage should take place without the sanction of the public authorities, the guardians of the poor requiring to be satisfied that the contracting parties possessed sufficient means to support a family. This law restricted marriage, and also caused an abnormally high illegitimate birth-rate. In 1855 the population was 4,541,556, an increase of 1,000,000 in forty years. By 1890 it was 5,594,982; by 1900, 6,176,057. In the 20th century the rate of increase has risen substantially, being 1·12 per annum as against ·51 in 1885. The illegitimate birth-rate has correspondingly decreased. In 1859 such births were 23·6 per cent. of the whole; in 1912 they were 12·6. Infantile mortality in Bavaria, although greatly reduced in recent years, is still the highest in Germany. The Bavarians, notwithstanding their beer-bibbing propensity, are essentially a sober and industrious people. In Franconia the people are mainly descended from the Frankish stock, in Swabia from the Allemannian; while the old Bavarian stock is represented in the districts of Upper and Lower Bavaria and in the Upper Palatinate. Nearly 2 per cent. of the population are not of German birth. Agriculture accounts for two-fifths of the population, industry one-third, and trade one-ninth. Every year 600,000 foreign labourers have to be imported for the fields, roads, and railways.

Religion.—In 1925 the Roman Catholics numbered 5,163,117; Protestants, 2,111,993; Jews, 49,145; besides a few Old Catholics. Protestants dominate in the Rhenish Palatinate, Middle and Upper Franconia. The state allows perfect freedom, guaranteeing the same rights to all religions. Church and state are separated. There are 2 Roman Catholic archbishoprics (Munich and Bamberg) and 6 bishoprics.

Bavaria has a good system of *education*, under the supreme direction of a minister of public instruction. The universities of Munich and Würzburg are Roman Catholic, of Erlangen Protestant. There are several extensive libraries, that of Munich being one of the largest in Germany. Art has been zealously cultivated, and since the days of King Ludwig I. has been peculiarly fostered by the state. There are numerous institutions for the furtherance of printing, sculpture, and music. In particular, Munich picture and sculpture galleries, Baireuth, and the Oberammergau Passion-play, bear witness to Bavaria's love of art.

Government.—Bavaria till 1918 was a constitutional kingdom, the throne hereditary in the male line. Its constitution dated from 1818, when it was declared a part of confederated Germany. The revolution of November 1918 set up a republic of Bavaria, a federal state of the German republic. After the murder of the leading revolutionary, Kurt Eisner, and an experiment in Communism, overthrown by military pressure from Prussia and Württemberg, Bavaria adopted a constitution in 1919. The 'Freistaat Bayern' has a single-chamber diet, elected for four years by all Bavarian citizens (male and female) of twenty-three years. The suffrage is equal, direct, and secret. Proportional representation is in use. There is one member for every 40,000 inhabitants. The ministry as a whole exercises supreme executive power, and is set up by and responsible to the diet. When Bavaria in 1870 became one of the states of the German empire, she still retained certain independent privileges, including control of the army in time of peace, and of posts and telegraphs. These with the state railways have been handed over to the central government (1919-20).

History.—The Boii, a race of Celtic origin, appear to have conquered the country about 600 B.C., and they retained it until shortly before the Christian era, when they were subjugated by the Romans. After the decay of the Roman power the Ostrogoths and Franks successively held possession of it, and it was a part of Charlemagne's empire. In 1180 it was transferred by imperial grant to Otho, Count of Wittelsbach. The Rhenish Palatinate was conferred on this family by the Emperor Frederick III. in 1216. Now followed quarrels between relatives, and divisions of territory, until the dukedom of Bavaria was severed from the Rhenish and Upper Palatinate (see PALATINATE); of the latter, however, it repossessed itself in 1621—the peace of Westphalia, in 1648, confirming the title of its princes to that possession, as well as its right to the electoral dignity, to which it had been raised in 1624. In the War of the Spanish Succession Bavaria supported France, and suffered considerably in consequence; but in 1777, on the extinction of the younger Wittelsbach line, it received the accession of the Rhenish Palatinate. In 1805 Bavaria was erected into a kingdom by Napoleon I. The king assisted Napoleon in his wars, and in consideration of his aid received large additions of territory. In 1813, however, the Bavarian king contrived to change sides opportunely, and thus managed to have confirmed to him, by the treaties of 1814–15, an extent of territory nearly as valuable as the possessions which the treaties of Presburg and Vienna had given him, and which he had now to restore to Austria. In 1818 a new constitution was granted.

In 1825 Ludwig I. ascended the throne. He was a well-meaning, liberal, and intellectual monarch; but he lavished the wealth of the kingdom to an extravagant degree on the embellishment of the capital, and on works of art, while neglecting works of practical value. The restriction of the freedom of the press, following the French revolution of 1830, excited so much opposition that it was soon after rescinded; but fresh dissatisfaction was created by the imposition of new taxes. The Jesuits now obtained an immense influence with the king, which they used to the detriment of popular rights. The wrath of the people was further aroused against their monarch by his connection with the notorious Lola Montez (q.v.), who for a time wielded great influence in the state. In March 1848, following the example set by the French revolutionists, the people of Munich seized the arsenal, and demanded reforms and the expulsion of Lola Montez. The king had to consent; but in the same month he abdicated. His son, Maximilian II., ascended the throne. He died in 1864, and was succeeded by his son, Ludwig II. In the war between Austria and Prussia in 1866 Bavaria took the Austrian side, and after the short struggle had to pay Prussia 30 million florins (£3,000,000), and to cede some small strips of territory. It also made a defensive and offensive alliance with Prussia; and in the struggle which followed between the party which aimed at bringing Bavaria into closer and friendlier relations with Prussia and the Ultramontane or 'Patriotic' party, the former had on the whole the best of it. Munich was the main centre of the Old Catholic (q.v.) movement. On the outbreak of the Franco-German war in 1870, Bavaria put its army under the command of the Prussian Crown Prince; and the Bavarian troops took a distinguished part in the battles of Weissenburg, Wörth, Sedan, before Paris, and on the Loire. In November 1870 the government agreed, on the granting of certain concessions, to become part of the German empire; and a month later it was the king of Bavaria who, at Versailles, proposed that the imperial crown should be conferred on the Prussian king. Thenceforward the struggle between liberals and Ultramontanes proceeded with varying success. King Ludwig carried his grandfather's love of art and music to excess; he finally went mad, and committed suicide by drowning, June 13, 1886. He should be remembered less for his artistic extravagances than for his generous patronage of the great composer Wagner. He was succeeded by his brother, Otho (also insane), under the regency of his uncle, Prince Luitpold (1821–1912), and of his cousin, Prince Ludwig (born 1845), who, empowered to terminate the regency, became king in 1913, reigned till the revolution of 1918 (see above), and died in 1921. See GERMANY.

Bax, ARNOLD EDWARD TREVOR, composer, was born at London in 1883, and was a brilliant student at the Royal Academy of Music, under Corder for composition and Matthay for piano. His compositions include a symphony (1922); *Garden of Fand* (1912), *November Woods* (1917), *Tintagel* (1917), and other orchestral symphonic poems; *St Patrick's Breastplate* (1923), and other choral works; viola concerto (1920); piano quintet (1915), string quartet (1918), various sonatas, and other chamber music. His music, markedly lyrical, is of a rich texture, and, at times, strongly under Celtic influences.

Bax, ERNEST BELFORT (1854–1926), born at Leamington, became a barrister and one of the founders of English Socialism, at first with William Morris in the Socialist League, afterwards in the Social Democratic Federation. He wrote much on Socialism, on Marat and the French Revolution, on the German Peasants' War and the Anabaptists, on Kant, and on the history of philosophy.

Baxter, JOHN (1781–1858), bookseller and printer at Lewes, was the first to use the inking-roller, and produced the illustrated and annotated 'Baxter's Bible.'—His son, GEORGE (1804–67), was the inventor of oil-colour printing, and produced a set of famous prints.

Baxter, RICHARD, was born 12th November 1615, at Rowton in Shropshire, and as his father had squandered his property in gambling, his education was irregular. After a brief trial of a court life, deepening religious impressions led to his entering the ministry, though in very delicate health, when he was about twenty-three years of age. He was ordained deacon by the Bishop of Worcester, and had entered on the mastership of Dudley grammar-school, preaching occasionally. After a year he went as assistant to a clergyman in

Bridgnorth, where he laboured for nearly two years. Originally, like his family and friends, an unhesitating conformist, he about this time found himself led by study of the controversial points to adopt some of the nonconformist views. In 1640 he was invited to officiate for the vicar of Kidderminster, where he remained for other two years. When the civil war broke out in 1642, he found his political views at variance with the public feeling of Worcestershire, and, some disorder arising, he retired to Coventry, where he ministered for two years to the garrison and inhabitants. His sympathies were almost wholly with the Puritans, and after the victory of Naseby he acted as chaplain to one of the regiments, and was present at the sieges of Bridgewater, Bristol, Exeter, and Worcester. Whilst with the army, he employed all his eloquence to moderate the extreme views, political and religious, of the soldiers, and with considerable success. His health continuing very uncertain, he retired from the army to the house of his friend, Sir Thomas Rouse, of Rouse-Lench, Worcestershire; and here, 'in continual expectation of death, with one foot in the grave,' he wrote the first part of the best of all his works, *The Saints' Everlasting Rest*, published in 1650. On the invitation of his former parishioners (1647), he returned to Kidderminster, and, in spite of continued bad health, laboured there for fourteen years with eminent success. 'When I came,' he says, 'there was about one family in a street that worshipped God, and when I came away there were some streets where there was not one poor family that did not do so.' At the Restoration, Baxter was appointed one of the king's chaplains, and took a leading part in the Savoy Conference. Presbyterian though he was, he did not object to a modified form of Episcopacy; yet he declined the proffered bishopric of Hereford. Shortly afterwards, in 1662, the Act of Uniformity having driven him out of the English church, he was compelled to leave Kidderminster, and was subjected to much hardship and persecution. Retiring to Acton, in Middlesex, in 1663, he spent the greater part of nine years chiefly in the composition of some of the most important of his works. The Act of Indulgence in 1672 permitted him to return to London, where he divided his time between preaching and writing. But in 1685, after the accession of James II., he was brought, for alleged sedition in his Paraphrase of the New Testament, before Judge Jeffreys, who treated him in the most brutal manner, calling him a dog, and swearing it would be no more than justice to whip such a villain through the city. Condemned to pay 500 marks, and to be imprisoned till the fine was paid, he lay in King's Bench Prison for nearly eighteen months, and was released only on the mediation of Lord Powis. The later years of his life were spent in tranquillity. He died on the 8th December 1691, in the seventy-fifth year of his age.

Baxter was a large-hearted man, and though a keen controversialist, had greater tolerance for the *persons* of those who were opposed to him than was common in those days. He was one of the ablest and most eloquent preachers of his time, and a most voluminous writer. His style is direct and manly; 'there is a vigorous pulse in his writings that keeps the reader awake and attentive,' and in his practical works he is intensely in earnest. Of these, *The Saints' Everlasting Rest* (1650), *Now or Never* (1663), *Call to the Unconverted* (1657), and *The Reformed Pastor* (1656) are the best known. His theological works, such as *Methodus Theologiæ, Catholic Theology*, and controversial works, are learned and profound, but are for the learned only. His theological catholicity and tolerance led some to regard him as an Arminian, while by others he was held to be a Calvinist. It was said of his works by Dr Isaac Barrow, with pardonable exaggeration, that 'his practical writings were never mended, and his controversial seldom confuted.' The few poems he has left are of considerable merit. The chief authority for his life is the remarkable and interesting autobiographical work published in 1696 as *Reliquiæ Baxterianæ* (abridged 1925 by J. M. Lloyd Thomas).

An edition of his practical works in 23 vols., with a Life by Orme, was published in 1830; selections in 1830 and 1840. The standard Life is by Dr F. J. Powicke (1924–27); shorter Lives are by Boyle (1883) and Davies (1886).

Bay is properly applied to an indentation of the sea into the land, with an opening wider than the depth. A gulf is understood to be deeper than a bay, and has often a narrow opening. These terms are often loosely applied; Baffin Bay, e.g., is really a gulf. When the body of water is large, and the entrance narrow, it becomes a shut sea, as the Baltic, the Red Sea, &c. Hudson Bay, the Persian Gulf, and the Gulf of Mexico, might with propriety be termed seas.

Bay, a name given to a number of trees and shrubs more or less resembling the Laurel or Victor's Laurel (*Laurus nobilis*), which is also called Sweet Bay (see LAUREL); the name *Bay* (Fr. *baie*, from Lat. *baccæ*, 'berries'), which was once exclusively applied to the fruit, having been extended to the whole plant. The larger-leaved hardy evergreen common in shrubberies, the Common Laurel or Cherry Laurel (*Prunus Laurocerasus*), is sometimes called Bay Laurel. The true bay-leaves are frequently used for flavouring puddings,

Sweet Bay (*Laurus nobilis*).

&c.; but those of the laurel are sometimes substituted. The fumes of prussic acid given off by the latter when bruised are used by entomologists in killing butterflies and moths. Bay-rum, used by perfumers, is an aromatic liquid obtained by distilling rum in which bay-leaves have been steeped.—The RED BAY of the Southern States of America is *Persea caroliniensis* (Lauraceæ).—The WHITE BAY of America is *Magnolia glauca* (see MAGNOLIA), and the LOBLOLLY BAY of the same country is *Gordonia Lasianthus*. See GORDONIA.

Bay-leaves with other evergreens decked houses at Christmas, were used at weddings, and were worn against thunder. The withering of bay-trees was reckoned a prognostic of evil. This is alluded

to in Shakespeare's *Richard II.* (II. iv.), who is here quoting from Holinshed. The following passage occurs in Parkinson's *Garden of Flowers* (1629): 'The bay-leaves are of as necessary use as any other in the garden or orchard, for they serve both for pleasure and profit, both for ornament and for use, both for honest civil uses and for physic, yea, both for the sick and for the sound, both for the living and the dead; . . . so that from the cradle to the grave we have still use of it, we have still need of it.'

Baya. See WEAVER-BIRD.

Bayaderes. See DANCING; NAUTCH GIRLS.

Bayam'o, or SAN SALVADOR, an inland town in the east of Cuba, in a fertile and healthy district on the north slope of the Sierra Maestra; pop. 7400.

Bayana, or BIANA, a town of the Rajput state of Bharatpur, 50 miles SW. of Agra, was one of the most famous forts in India. There are many temples, and the whole ridge of the hill is covered with remains of large buildings. Pop. 5000.

Bayard, JAMES ASHETON (1767–1815), born in Philadelphia and bred at Princeton, became a lawyer, and, elected to the House of Representatives, was a leader of the Federalists. From 1805 to 1813 he was a senator, and was one of the commissioners to negotiate the peace with Britain in 1814.—His son, of the same name (1799–1880), was an eminent barrister, and in the United States senate was a conspicuous democrat, and chairman of the judiciary commission.

Bayard, PIERRE DU TERRAIL, CHEVALIER DE, 'the knight without fear and without reproach,' was born in 1476, at the Chateau Bayard, near Grenoble. He was perhaps the only hero of the middle ages who deserved the unmingled praise and admiration bestowed upon him—simple, modest, a sterling friend and tender lover, pious, humane, and magnanimous. After acting as page to the Duke of Savoy, he entered the service of Charles VIII., whom he accompanied to Italy in 1495. He won his spurs at the battle of Fornovo, where he captured a standard from the enemy. Early in the reign of Louis XII., in a battle near Milan, Bayard followed the defeated and retreating forces with such impetuosity that he entered the city with them, and was made a prisoner, but the Duke Ludovico Sforza released him without ransom. At Barletta, in 1502, Bayard and ten other French knights fought a tournament with an equal number of Spaniards, in order to decide their respective claims to superiority; and although seven Frenchmen were overthrown in the first charge, the result, chiefly through Bayard's bravery, after a six hours' combat, was declared equal. Next we find him fighting bravely in Spain, and against the Genoese and Venetians. When Pope Julius II. declared war with France, Bayard hastened to support the Duke of Ferrara; but failed in his scheme for making the pope a prisoner. Subsequently, he won fresh laurels in Spain. In the war with Henry VIII. of England—who with the Emperor Maximilian had threatened Picardy, and besieged Therouenne, in 1513—when the French, on one occasion, were about to lay down their arms, Bayard made a sudden attack on an English officer, and, pointing his sword at his breast, said: 'Yield or die.' The Englishman gave his sword to Bayard, who in exchange gave his own, saying: 'I am Bayard, your prisoner; and you are mine.' The emperor and the king of England exchanged their prisoners without any demand of ransom for Bayard. In 1515, when Francis I. ascended the throne, Bayard was sent into Dauphiné to make a way for the army over the Alps and through Piedmont. In this expedition he made Prosper Colonna a prisoner. Next, at Marignano, he gained a victory for the king, who, in consequence, submitted to receive the honour of knighthood from Bayard. When Charles V. broke into Champagne, at the head of a large army, Bayard defended Mézières against all assaults, and on his entry into Paris he was hailed as the saviour of his country, was made knight of the order of St Michael, and appointed commander in his own name of 100 men-at-arms, an honour till then confined to princes of the blood-royal. He was mortally wounded by a shot from an arquebus, while defending the passage of the Sesia, April 30, 1524. He died with his face to the foe, reciting the *Miserere;* and to Bourbon, who came up and expressed his pity—'My lord,' he said, 'I thank you, but pity is not for me, who die a true man, serving my king; pity is for you, who bear arms against your prince, your country, and your oath.' So highly was he esteemed for all noble qualities, that his death was lamented not only by the French king and nation, but also by his enemies. His body, taken by the enemy, was restored to France, and interred in the church of the Minorites' monastery, near Grenoble.

See the Lives by Hare (1911), Ville (1901), Terrebasse (1871), Poirier (1889), Champier (1525), and 'Le Loyal Serviteur' (perhaps his secretary, Jacques Joffrey, 1527; ed. O. H. Prior, 1927, transl. Sara Coleridge, 1825, Kindersley, 1848, Larchey, 1883).

Bayard, THOMAS FRANCIS (1828–98), born at Wilmington, Del., became a barrister, and, like his father and grandfather (see BAYARD, JAMES ASHETON) and other members of his family, sat in the United States senate. He was secretary of state under Cleveland, and in 1893–97 was ambassador to Britain.

Bayazid', a town of Turkish Armenia, beautifully situated on one of the spurs of Ala Dagh, about 15 miles to the SW. of the foot of Mount Ararat. Prior to 1829 its population was upwards of 15,000, and it had a brisk trade; but afterwards the dread of Russian encroachments drove away most of its Armenian inhabitants, and it has now but 2000, mostly Kurds. At Bayazid the Russians defeated a Turkish army in 1854. In 1877 it was seized by the Russians, but was restored to Turkey by the Berlin Congress of 1878. It was again occupied by the Russians in November 1914.

Bayazid' I. See BAJAZET.

Baybay, a town on the west coast of the island of Leyte, in the Philippine Islands, at the mouth of the Pambanganan River, 45 miles SSW. of Tacloban; pop. 25,000.

Bayberry. See CANDLEBERRY.

Bay City, a city of Michigan, U.S., on the Saginaw River, which is here spanned by three bridges, 4 miles from Saginaw Bay, and 108 miles NNW. of Detroit. It is an important railway centre. A large trade in timber and salt is carried on, and there is some shipbuilding. Pop. 48,000. On the left bank of the river are the consolidated villages of Salzburg, Wenona, and Banks, known as West Bay City; and the village of Essex is at the north end of the city. These were consolidated with Bay City in 1891.

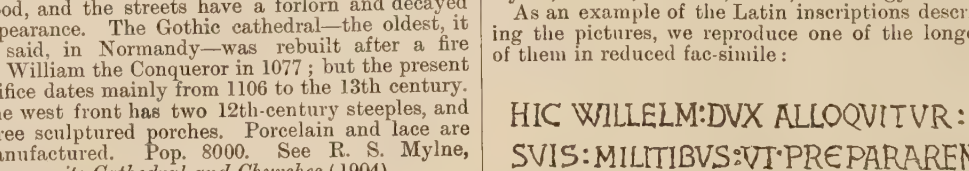
Bayer, JOHANN, a German constructor of charts of the stars, was born in 1572, at Rhain, in Bavaria, and died an advocate at Augsburg in 1625. His zeal for the Protestant Church was so conspicuous that he was commonly called *Os Protestantium* ('the Mouth of the Protestants'). His contributions to astronomy are contained in his *Uranometria* (1603), in which he gave 51 maps of the heavens, constructed from the observations of his predecessors, and followed by explanations in his *Explicatio* (1654).

Bayern. See BAVARIA.

Bayeux, an ancient city of Normandy, in the French department Calvados, on the Aure, 15 miles NW. of Caen. Many of the houses are built of wood, and the streets have a forlorn and decayed appearance. The Gothic cathedral—the oldest, it is said, in Normandy—was rebuilt after a fire by William the Conqueror in 1077; but the present edifice dates mainly from 1106 to the 13th century. The west front has two 12th-century steeples, and three sculptured porches. Porcelain and lace are manufactured. Pop. 8000. See R. S. Mylne, *Bayeux, its Cathedral and Churches* (1904).

Bayeux Tapestry, the name given to a panorama of sewed work, representing the invasion and conquest of England by William the Conqueror, preserved in the public library of Bayeux. This is not a Tapestry (q.v.) in the usual sense of the word, but closely resembles sampler work. It is sewed on a band of linen about 230 feet long by 20 inches wide, and is divided into 72 scenes, which are generally separated from each other by a tree or other object. Most of the scenes are described by Latin inscriptions sewed along the upper margin of the tapestry. The work contains figures of 623 persons, 762 horses, dogs, and other animals, 37 buildings, and 41 ships or boats. The figures are worked in worsteds of eight different colours, dark and light blue, red, yellow, dark and light green, black, and buff. The drawing is rude, but vigorous and spirited, and no attempt is made to show local colour; horses, dogs, &c. are blue, green, red, or yellow, as may have suited the convenience of the design. To distinguish objects at different distances from the spectator, different coloured worsteds are employed, with sometimes curious effect: thus, a blue horse may have its off legs red, or a yellow one green, and so on. The method of sewing has been to cover the object with threads laid side by side, and to cross-stitch it at intervals: the faces, hands, and, where bare, the legs are simply outlined in coloured worsted. The persons mentioned by name in the inscriptions are: King Edward the Confessor, Harold, Guy of Ponthieu, Duke William, Conan, Archbishop Stigand, Bishop Odo, Eustace of Boulogne, Robert of Mortain, Leofwine, Gyrth, Turold, Wadard, Vital, and Ælfgyva.

As an example of the Latin inscriptions describing the pictures, we reproduce one of the longest of them in reduced fac-simile:



It may be translated: 'Here Duke William exhorts his soldiers to prepare themselves manfully and discreetly for battle against the army of the English.' Our illustration gives the concluding portion of this scene, and represents the onslaught of the Norman knights on the English at the battle of Hastings.

This pictorial history—for so it may be called, and indeed, in several particulars, it is more minute than any written history we have—opens with Harold, prior to his departure for Normandy, taking leave of Edward the Confessor. Harold is next observed, accompanied by his attendants, riding to Bosham with his hawk and hounds; and he is afterwards seen, successively, embarking from the Sussex coast; anchoring in France and being made prisoner by Guy, Earl of Ponthieu; redeemed by William, Duke of Normandy, and meeting with him at his court; assisting him against Conan, Earl of Bretagne; swearing on the sacred relics never to interfere with William's succession to the English throne, &c.; and finally re-embarking for England. The tapestry

Part of Bayeux Tapestry—Battle of Hastings.

then represents Harold narrating the events of his journey to Edward the Confessor, whose death and funeral obsequies we next see. Harold then receives the crown from the English people, and ascends the throne; and next we have the news brought to William, who takes counsel with his half-brother, Odo, Bishop of Bayeux, as to the invasion of England. Then follow representations of the active war-preparations of the Normans; their embarkation; disembarkation; march to Hastings, and formation of a camp there; the battle, the death of Harold, and the flight of the English, with which the tapestry finishes.

Much laborious argument has been expended on the origin of the tapestry. Montfaucon and his 18th-century contempories assumed and argued (for the tradition is quite modern) that it must have been the work of William's queen, Matilda,

and her women; others have assigned it to the Empress Matilda. A third party, with perhaps still stronger reasons, consider it to have been executed as a decoration for the cathedral of Bayeux, under the orders of Odo, William's half-brother, who was, in 1048, appointed Bishop of Bayeux, a see which he held for fifty years. He took an active part in the invasion of England, appears as a prominent figure in the tapestry, and was rewarded by William with the earldom of Kent. He lavished much of his wealth on Bayeux, and rebuilt the cathedral in 1077. The fact that the tapestry exactly fitted round the nave of the cathedral, and that, with the exception of a brief visit to Paris in 1803–4, for the inspection of Napoleon I., it has never been out of Bayeux, seems to give strong probability to the Bishop Odo theory.

Whoever may have been the author of it, there is no doubt that strong evidence exists in the tapestry itself of its having been designed at a date, if not exactly contemporary with the events depicted, at anyrate immediately afterwards.

The earliest existing mention of it is made in an inventory of the ornaments of the cathedral in 1476, where it seems to have been used at certain seasons to decorate the nave. There it remained unknown, except to the people of Bayeux, until 1724, when a drawing of a portion of it, which came into the possession of M. Lancelot, a member of the Académie des Inscriptions, finally led to its discovery a few years later. Although it has encountered many dangers from fire, revolution, invasion, and other causes, it has passed unscathed through them all; and it exists now as complete, and with its colours as fresh, as when executed.

It passed out of the keeping of the cathedral authorities towards the end of the 18th century, and was for many years in the hôtel de ville. Here it was barbarously used, being kept on a couple of rollers and exhibited to the curious by winding from the one to the other. A knowledge of its vast value, however, gradually dawned on its custodiers; and in 1842 it was deposited in an apartment built for the purpose, and placed under the care of the public librarian. This gentleman, M. Lambert, not only superintended the relining of the tapestry, but carefully and successfully restored certain portions which had suffered from age and the rollers. In 1871, during the Franco-Prussian war, the Prussians were so near the town that the tapestry was taken from the glass case in which it is displayed, and hidden till all danger was past.

The great importance of the tapestry as a contemporary record of the costumes and manners and customs of a period of such consequence in the history of England was at once recognised on its discovery, and at various times careful drawings have been made of the complete work, and about fifty works and treatises have been published concerning it. The best of these drawings was undoubtedly that made by Mr C. Stothard for the Society of Antiquaries of London. Commenced in 1816, it occupied two years' labour, and was published as vol. vi. of the *Vetusta Monumenta* by the Society in 1819. In 1872 the English Committee of Council on Education, having obtained the permission of the authorities at Bayeux, commissioned Mr Dossetter to prepare a full-sized photograph of the whole tapestry.

A reduction of this photograph was edited and described by M. F. R. Fowke, and published by the Arundel Society in 1875 (new ed. 1898). See the bibliography in Fowke; the article EMBROIDERY for the history of pictorial sewed work; Collingwood Bruce's *Bayeux Tapestry Elucidated* (1885); *Notice Historique et Descriptive sur la Tapisserie de la Reine Mathilde* (Bayeux, 1873); *La Tapisserie de Bayeux*, by Jules Compte (1878); a work published in London in 1907, and one by M. Deslandes of Bayeux in 1909; and *The Book of the Bayeux Tapestry*, by Hilaire Belloc (1914).

Bay Islands, a small group in the Bay of Honduras, 150 miles SE. of Balize. The cluster was proclaimed a British colony in 1852, but in 1859 they were ceded to the republic of Honduras. The chief of the six islands are Roatan (30 by 9 miles; 900 feet high), and Guanaja, whence in 1502 Columbus first sighted the mainland of America. Total pop. 3000.

Bayle, PIERRE, one of the most independent thinkers of the 17th century, was born in 1647 at Carlat, near Foix, in Languedoc. The son of a Calvinist pastor, he yet studied philosophy under the Jesuits at Toulouse. The arguments of his tutors, and still more his friendly intercourse and quiet disputation with a Catholic clergyman who lived in the neighbourhood, led him to doubt the orthodoxy of Protestantism, and shortly prevailed so far that he openly renounced his father's creed, and adopted Catholicism. But in seventeen months the conversation of his relatives brought him back to the Protestant profession. To escape ecclesiastical censure, he withdrew to Geneva, and thence to Coppet, on the Lake of Geneva, where he studied the philosophy of Descartes. After a few years he returned to France, and in 1675 was elected to fill the chair of Philosophy in the university of Sedan. In this office he remained until 1681, when the university was suppressed. His next appointment was that of professor of Philosophy at Rotterdam. The appearance of a comet in 1680 having given occasion to a widely spread alarm, Bayle in 1682 published his *Pensées Diverses sur la Comète*, a work full of learning, and treating, in discursive style, many topics of metaphysics, ethics, theology, history, and politics. This was followed by *Critique Générale de 'l'Histoire du Calvinisme de Maimbourg.'* In 1684 he commenced a periodical, *Nouvelles de la République des Lettres*, one of the first successful attempts at a popular journal of literary criticism. The revocation of the Edict of Nantes led Bayle to write his *Commentaire Philosophique sur ces Paroles de l'Évangile: 'Contrains-les d'entrer,'* which professed itself to be a translation from the English, and contained a strong defence of the principle of toleration. In consequence of the accusations brought forward by the theologian Jurieu, who regarded Bayle as an agent of France, and the enemy of Protestantism, Bayle, though he skilfully defended himself, was in 1693 deprived of his license to teach. He now assiduously devoted his leisure to the *Dictionnaire Historique et Critique* (1st ed. 2 vols. Rotterdam, 1696; latest ed. 16 vols. Paris, 1820). This was the first work published under his own name. Again Jurieu came forward as Bayle's adversary, and induced the consistory of Rotterdam to censure the Dictionary, chiefly on account of the supposed irreligious tendency of the article on 'David,' and the commendation bestowed on the moral character of certain atheists. Bayle promised to expunge all the objectionable matter; but afterwards, when he found that the public entertained a different and more favourable opinion of the passages than the Rotterdam Consistory, he judged it best to allow them to remain as they were, or made only slight alterations. New opponents were called into the arena by his *Réponse aux Questions d'un Provincial*, and the continuation of his *Pensées sur la Comète*. Jacquelot and Leclerc now attacked his religious opinions, while others persecuted him as the enemy of Protestantism and of his adopted country, Holland. These literary and theological

controversies had a bad effect on his failing health, and a disease, for which he refused to employ medical aid, proved fatal. He died December 28, 1706.

Accustomed to view every question scrupulously on all sides, Bayle was accused of doubting on religious matters generally; at least, it is not to be denied that his scepticism disbelieved the wisdom of the religious dogmatism that ruled both Catholics and Protestants in his day. His hostility to bigotry rather originated in his indifference to the doctrines about which theologians quarrelled, than in any clear conviction of the iniquity of religious persecution. His scepticism was not based on a philosophical theory, but was rather that of an accomplished littérateur. With great eloquence and persistency he vindicated the doctrine that moral characteristics may flourish independently of particular religious opinions. His learning was perhaps more varied and curious than precise; his style is clear and natural, fluent but diffuse. Many articles in the Dictionary seem to have been chosen merely as vehicles to introduce numerous digressions in notes, not a few of which are prolix and uninteresting; but the greater number of the articles are characterised by good sense, logic, critical acumen, and learning. The work was proscribed both in France and Holland, was consequently very widely diffused in both countries, and exercised an immense influence over the literature and philosophy of the Continent. It was the dawn of the scepticism of the 18th century, and may be historically regarded as the protest of the enlightened human intellect against the irrational dogmatism of the churches.

His *Œuvres Diverses* were published in four volumes at The Hague (1725-31). See Life of Bayle, in French, by Desmaizeaux (Amsterdam, 1730), and in German by Feuerbach (1838); and the article by Bonet-Maury in the Hauck-Herzog *Realencyklopädie* (1896-1909).

Baylen. See BAILEN.

Bayly, THOMAS HAYNES, an English song-writer and author, was born at Bath, October 13, 1797. After deserting successively both law and the church, Bayly, during a short sojourn amid the brilliant society of Dublin, first discovered his own powers as a ballad-writer and achieved his earliest successes. In 1824 he settled in London; and his *I'd be a Butterfly* was quickly followed by *The Soldier's Tear*, *We met—'twas in a Crowd*, *She wore a Wreath of Roses*, *Oh, no, we never mention her*, and many others, familiar wherever the English language is spoken. Bayly also wrote a novel, *The Aylmers*, several volumes of verse, some tales, and numerous dramatic pieces, the best of which was *Perfection*, a clever little comedy, produced by Madame Vestris, and once very popular. In his last years he suffered much from confirmed jaundice and dropsy, which brought about his death, April 22, 1839.

Bayne, PETER, born at Fodderty, Ross-shire, 19th October 1830, studied at Marischal College, Aberdeen, and became editor of newspapers successively in Glasgow, Edinburgh, and London. Author of *Christian Life at the Present Time*, *The Life of Hugh Miller* (1871), *Lessons from my Masters*, *Two Great Englishwomen*, and a *Life of Luther* (1887), he died 10th February 1896.

Baynes, THOMAS SPENCER, born at Wellington, Somerset, 24th March 1823, studied at Bristol College and Edinburgh University. At Edinburgh he became assistant to Sir William Hamilton, publishing a translation of the *Port Royal Logic* (1851), and an *Essay on the New Analytic of Logical Forms* (an exposition of Hamilton's *Quantification of the Predicate*). In 1857-64 he was assistant-editor of the *Daily News*, and in 1864 became professor of Logic, Rhetoric, and Metaphysics in the university of St Andrews. He had edited twenty-two volumes of the ninth edition of the *Encyclopædia Britannica* at his death, 30th May 1887. See his *Shakspere Studies* (1894), with memoirs by Prof. Lewis Campbell, and Skelton's *Table-talk of Shirley* (1895).

Bay of Islands, an admirable harbour on the east coast of the northernmost portion of the North Island of New Zealand. It is about 11 miles across, and is so named from its numerous islands (nearly a hundred). Russell, the chief shipping port in the north of New Zealand, is on its south side.

Bayonet, supposed to be named from Bayonne, of which Puységur, its alleged inventor (*circa* 1650), was a native, is a dagger or small spear fixed at the end of a musket. According to some authorities, the bayonet is just the Malay Kris (q.v.), introduced by Dutch soldiers from the East Indies; anyhow, it is certain that bayonets were manufactured at Bayonne in 1663. These, called *bayonets-à-manche*, had handles which fitted into the muzzle of the guns; but the *bayonet-à-douille*, or socket-bayonet, fitting round the barrel, so that the musket could be fired with the bayonet fixed, was invented by General Mackay in 1689, and introduced by Vauban into the French army in 1703. The bayonet with which the rank and file of the British infantry were armed up to the issue of the Lee-Metford magazine rifle (see RIFLES) was triangular in section, fitting round the rifle barrel by means of a socket, was 22 inches long, and weighed 15½ oz. It was only adapted for thrusting. The latest pattern of it is seen in fig. 1, A. The sword-bayonet, which was a cut-and-thrust weapon of about the same weight and 24 inches long, sharpened on its front edge, had a handle by which it could be used as a separate weapon. It was fixed on the rifle as shown in fig. 1, B, and was carried by rifle regiments, gunners, engineers, all infantry sergeants, and seamen, being better adapted to the shorter rifle with which they were armed. As a result of the contract system in the manufacture of these weapons, various rumours got abroad of their quality, and according to *The Times* of 11th February 1886, 'one-third of the British army is armed with weapons which will fail our soldiers in the hour of need;' and this remark was to a great extent verified during the operations in the Sudan in that year, where many bayonets of both patterns were twisted and bent in charging—especially some naval sword-bayonets which had been made out of old cutlass-blades. To guard against a repetition of this, all the bayonets in use in the United Kingdom were re-tested early in 1887. The bayonet then issued to all branches of the service for the long Lee-Metford rifle was a blade 12 inches long, double-edged, and with a point for thrusting. It was fastened to the *under* side of the rifle-barrel,

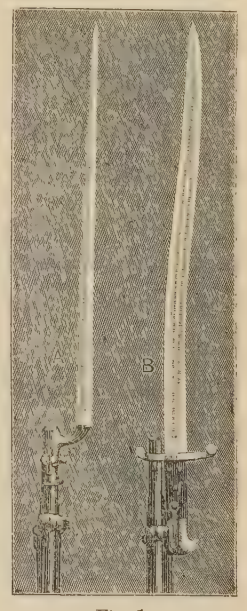


Fig. 1.

whereas the older bayonets were fastened to the right side. The army now has the short Lee-Enfield rifle, 3 feet 8 inches long, and the blade of the bayonet (fig. 2) is 1 foot 5 inches long, the

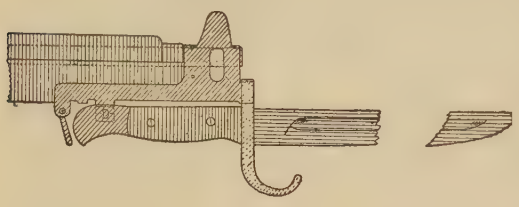


Fig. 2.

whole in position being 5 feet 1½ inch long. The bayonet is single-edged, is on the under side of the rifle, and is no longer fixed to any part of the barrel, which is cased with hardwood right up to the muzzle. By this means there is less interference with the accuracy of the shooting when the bayonet is fixed.

The blades are forged from the finest steel, and after being hardened and tempered are severely tested. The testing-machine is a curved block, with a hole at one end, and covered with a wire guard for the protection of the workman. The point of the blade is placed in the hole, and the blade is bent to the curvature of the block, and must spring back perfectly straight. Very few fail to pass the test, those that fail mostly breaking short off. See FENCING.

Bayonne (Roman *Lapurdum*), a town of France, in the department of Basses-Pyrénées, situated at the confluence of the Adour and Nive, 4 miles from the Bay of Biscay. The two rivers divide the town into three parts—Great Bayonne, Little Bayonne, and St Esprit. Many of its streets are narrow and dark, but the town wears an air of wealth and comfort. Notwithstanding railway competition and a troublesome bar at the Adour mouth (which was 12 miles farther north till the 16th century), the port of Bayonne has a growing trade. The manners of the inhabitants as well as the architecture remind us of Spain, only 22 miles distant, but among the poorer natives the Basque type and the Basque tongue are predominant. The cathedral, begun in the 13th century, is admired for its three naves, its stately portal, and its elaborate roof. The Château Vieux (now military headquarters) dates from the 12th century. The Musée Bonnat contains works of art presented to his native city by Léon Bonnat, the painter. The citadel, on a height in St Esprit, was one of Vauban's masterpieces. Having opened its gates only during the armistice in 1814, it still bears its proud motto, '*Nunquam polluta.*' Bayonne's manufactures include chocolate and leather; its hams are celebrated; in the district are blast-furnaces and chemical manure works; and it also exports pitwood, wool, salt, resin, and turpentine. An electric tramway runs to the Spanish border *viâ* Biarritz and St Jean de Luz. Bayonne belonged to the Duchy of Aquitaine, then to Gascony, and was in the hands of the English from 1152 to 1451. During the wars with Spain it was often besieged, but never taken. The 'Bayonne Decree' of Napoleon in 1808 against American shipping was an episode in the Continental System (q.v.). In 1814 it was besieged in vain by the British and Spanish allies, and in 1813–14 was the scene of a series of desperate bloody struggles. The Bayonet (q.v.) may take its name from Bayonne. Pop. (1926) 31,436.

Bayonne, a city of New Jersey, on the peninsula S. of Jersey City, between New York and Newark bays. It is one of the chief manufacturing cities of the state, with great docks, chemical-works, machine and boiler works, silk-factories, and the main plant of the Standard Oil Company (its refineries here being connected by pipe lines with New York, Philadelphia, Baltimore, and Pittsburg). Pop. (1890) 19,033; (1920) 76,754.

Bayreuth. See BAIREUTH.

Bay-window, or (corruptly) BOW-WINDOW, a window peculiar to late Gothic and Renaissance architecture, so called because it forms a *bay* or projecting space outwards from a room. The external walls of bay-windows are, for the most part, either rectangular or polygonal, the semicircular form, from which the term *bow* was probably derived, having been unknown prior to the introduction of the debased Gothic. Though

Bay-window; Cowdray House, Sussex (from Parker).

mentioned by Chaucer, bay-windows are not found in any of the styles before the Perpendicular, during the prevalence of which they were frequently introduced, particularly in halls. Bay-windows generally reach to the floor, and are frequently supplied with a seat, which is called the *bay-stall.* There are many very beautiful examples of bay-windows in the college-halls of Oxford and Cambridge. When used in upper stories, such windows are supported on corbels, or large projecting mouldings. See ORIEL.

Baza, an old town of Spain, 50 miles ENE. of Granada. It lies in a fertile plain, has remains of Moorish fortifications, a sulphur-spring, and 16,000 inhabitants engaged in the production of wine, fruit, and hemp. The *Bastia* of the Romans, and *Bastania* of the middle ages, Baza under the Moors was a flourishing town, with a population of 50,000.

Bazaar, or BAZAR (Pers. *bâzâr*), an oriental market-place, either open or covered, where various articles, including slaves, are exposed for sale, and where eastern merchants meet for transaction of business, as on 'Change or at the Bourse in England and France. The bazaar in Ispahan is one of the finest; that in Tabriz perhaps the largest. The great bazaars of Constantinople and Cairo are better known to Europeans. Among western peoples, establishments for the sale of fancy goods are now often styled bazaars. The name is also commonly applied to a sale of miscellaneous articles, contributed gratuitously, for the purpose of raising money for a charitable or other special purpose.

Bazaine, FRANÇOIS ACHILLE, a marshal of France, born at Versailles, 13th February 1811. Entering the army in 1831, he served with distinction in Algeria, in Spain, in the Crimea, and in the Italian campaign of 1859. He took part in the

French expedition to Mexico in 1862, and from 1863 till the end of the war held supreme command of the French forces. Already, in 1836 in Africa, he had gained the cross of the Legion of Honour; in 1856 he had been promoted to be Commander of the Legion; in 1863 he received the Grand Cross; and in 1869 he was made commander-in-chief of the Imperial Guard. At the outbreak of the great war with Germany, Bazaine was placed at the head of the 3d army corps near Metz. After the battles of Wörth and Forbach he took command of the main French armies, and on August 14, 1870, began a retreat from Metz. Defeated at Mars-la-Tour and Gravelotte, he retired within the fortifications of Metz, which was immediately invested by Prince Frederick Charles. Attempts to escape failing, Bazaine capitulated October 27, when 3 marshals, over 6000 officers, and 170,000 men laid down their arms and became prisoners of war. In 1873 Bazaine was tried by a court-martial, and sentenced to degradation and death for having failed to do his duty. The sentence was commuted to twenty years' imprisonment. But in 1874 Bazaine contrived to escape from the fortress on the Île Ste Marguerite, near Cannes, where he was confined, and ultimately he made his way to Madrid. He published in 1883 a justification of himself in *Épisodes de la Guerre de 1870 et le Blocus de Metz*, which was immediately prohibited in France. He died 23d September 1888.

Bazán, EMILIA PARDO. See PARDO BAZÁN.

Bazard, SAINT-AMAND, a French Socialist, was born at Paris in 1791. After the Restoration he helped to found the revolutionary society of the 'Amis de la Vérité,' and in 1820 an association of French Carbonari. He was the leading conspirator in the 'plot of Belfort.' In 1825 Bazard, impressed with the necessity of a total reconstruction of society, attached himself to the school of Saint-Simon, and became one of the editors of a Saint-Simonian journal termed *Le Producteur*. In 1828 he delivered at Paris a series of lectures, the substance of which was published in the *Exposition de la Doctrine de Saint-Simon* (2 vols. 1828–30), of which the first part was by Bazard, the second being chiefly the composition of Enfantin. He and Enfantin became the acknowledged leaders of the school. After the July revolution (1830) a larger scope was afforded to the Saint-Simonians. The masses were attracted by the doctrine that 'all social institutions ought to have for their end the moral, intellectual, and physical amelioration of the poor.' In a short time Bazard and his friends had 'created a new society, living in the midst of the old,' with peculiar laws, manners, and doctrines. But Bazard's connection with it was of short duration. He differed from Enfantin on the doctrine of the emancipation of women, and in 1831 seceded in disgust. His efforts to found a school of his own proved unsuccessful, and during a heated discussion with his former friend Enfantin he was struck with apoplexy, from the effects of which he never recovered. He died 29th July 1832.

Bazardjik, PAZARDJIK, or DOBRITCH, a town of Rumania, 26 miles N. of Varna, has an important fair in April. Population, 17,000. Founded 300 years ago, it was stormed by the Russians on 2d June 1774, and 3d June 1810. Bulgarian till 1913, it was ceded by the treaty of Bucharest.—TATAR-BAZARDJIK, or TATAR-PAZARDJIK, is a town of Bulgaria, on the Upper Maritza, 23 miles W. of Philippopolis by rail, with warm baths, and 20,000 inhabitants, having greatly increased since the Russo-Turkish war of 1877–78.

Bazeilles, a village in the French department of Ardennes, near the right bank of the Meuse, 4 miles SSE. of Sedan. A pretty, well-to-do place, it was burnt to the ground by the Bavarians on the day of the battle of Sedan (1st September 1870), in revenge either for its obstinate defence by the marines, or for the villagers having fired on the invaders, and maltreated some of their wounded. It was rebuilt, in great measure with English contributions, and now has some 2000 inhabitants.

Bazigars, a tribe of natives scattered over India, known also as Panchpiri, Kunjra, or Nats, most of whom lead a nomadic life. They do not intermix with the Hindus. It has been remarked that they have some features of resemblance to the Gipsies of Europe and Asia. They are of seven castes; the Bazigars proper are Mohammedans in religion and habit; the Panchpiri have no set system of religion, but with native flexibility adopt that of the village or place where they may be sojourning. The men collect medicinal herbs, exhibit wild beasts, or sell mats of their own manufacture, are adroit jugglers, and excel in feats of activity; some of the women sell trinkets, and excel in lascivious dances; others practise physic and cupping. They are short-lived, owing to their lives of systematic debauchery.

Bazin, RENÉ, born at Angers in 1853, studied law at Paris, but in 1888 made a name for himself by *Une Tache d'Encre*, followed by a long series of novels, works of travel, pictures of provincial life, social and literary studies, including *En Province*, *Les Oberlé*, *La Terre qui Meurt*, *Le Duc de Nemours*, *Stephanette*.

Bazoche, or BASOCHE, the guild of the clerks of the parliament of Paris, under a mock king, to whom Philip the Fair granted the privilege of performing religious plays in 1303. The officers of this harmless monarchy affected on all occasions the language of royalty. Its jurisdiction included the consideration and decision of all controversies that arose among the clerks, and it administered justice twice a week. At the carnival the members acted a species of satirical morality (see MYSTERIES), in which they made extensive use of the liberty granted to them, in ridiculing vices and the favourites of fortune. Of course, they could not fail to provoke enmity and occasion serious scandal, and in 1540 they were interdicted as incorrigible. They are interesting, however, as the forerunners of the comedy of Molière.

Bazzi, GIOVANNI ANTONIO. See SODOMA.

Bdellium, a gum-resin resembling Myrrh (q.v.) in appearance and qualities, but weaker, and at the same time more acrid. High medicinal virtues were ascribed to it by the ancients, but it is now little used internally, although occasionally employed as an ingredient of plasters. It is supposed to be the produce of Commiphora (or Balsamodendron) in India and in Senegal—trees or shrubs belonging to the Burseraceæ, a family remarkable for the number of similar substances which it produces.—Egyptian bdellium, however, is obtained from the Dum palm, *Hyphæne thebaica*. A similar substances is yielded also by *Othonna Ceradia*, of the Compositæ; whilst the Sicilian bdellium, formerly used in medicine, is produced by *Daucus Gingidium*, a species of the same genus to which the carrot belongs.—The bdellium mentioned in Genesis ii. 12 and Numbers xi. 7 may be this or a similar gum-resin; some have, with more probability, understood it to be a precious stone —a carbuncle, crystal, beryl, or pearl. See BALSAMODENDRON.

Beaches, RAISED. Geology teaches that the frame of the land is liable to risings and depressions, even in the present age. Several districts

in different parts of the world have been raised, in consequence of earthquakes, within the memory of the present generation; and there is evidence to show that the coast of Siberia east of the Lena, Spitsbergen, Novaya Zemlya, and the Scandinavian Peninsula (with the exception of Scania, in the extreme south) have been recently elevated. These facts prepare us to learn that around the British Islands, and in other parts of the earth, there are tracts of ground at various elevations above the present sea-level which have evidently been sea-beaches at a former time. The evidences consist of, first, the levelness of the ground in the general direction of the present shores over considerable spaces; second, the alternating beds of sand and gravel, such as we see composing the present beach; and, third, the presence of marine littoral shells. There are also what may be called terraces of erosion—indentations made in a rocky coast by the lip of the sea in ancient times—usually consisting of a flat platform presenting patches of gravel, and of a backing wall or sea-cliff, the latter sometimes penetrated with deep caves. In Scotland there are several well-marked raised beaches, at 100, 75–80, 45–50, 25–30 feet above the present sea-level. These beaches are best seen about the maritime regions of central Scotland. Most of the seaport towns are built upon the 25–30 feet beaches. Similar beaches are found in Ireland, and likewise in England, where, however, they do not occur at a greater elevation than 20 to 30 feet above the sea. Terraces of marine erosion (*Strandlinier*) occur in northern Norway at various levels, up to a height of 600 feet or thereabout. In the higher latitudes of the northern and southern hemispheres raised beaches are well developed, some reaching elevations of 2000 feet and more. See Dr Robert Chambers, *Ancient Sea Margins* (1848), and the standard works on geology.

Beachy Head, the loftiest headland on the south coast of England, projecting into the English Channel, 3½ miles SSW. of Eastbourne, Sussex. It consists of perpendicular chalk-cliffs, 575 feet high, forming the east end of the South Downs. Several caverns have been cut out in the rock for shipwrecked seamen to take refuge in; but shipwrecks have been far fewer since 1831, when the Belle Toute Lighthouse was built 2½ miles to the west. This lighthouse, 285 feet above the sea, is superseded by one at the foot of the cliff. The view from Beachy Head, in clear weather, extends to Hastings, the Isle of Wight, and France. The cliffs are the resort of myriads of sea-fowl. Off this point the French fleet, under Tourville, beat the combined English and Dutch fleets, under Torrington, 30th June 1690.

Beacon denotes any signal set upon a height, but especially the alarm-fires at one time used to spread the intelligence of foreign invasion or other great event. These fire-signals were in use in the earliest times, and notices of them are found in the literary remains of ancient Persia, Palestine, and Greece. They were made by kindling a pile of wood on the tops of lofty mountains, and keeping the flame bright by night, or having the fire so covered as to emit a dense smoke by day. There were various preconcerted modes of exhibiting the light or smoke, so as to indicate the nature of the intelligence. Thus, an act of the parliament of Scotland in 1455 directs that one bale or fire shall be warning of the approach of the English in any manner; two bales blazing beside each other, that they are *coming indeed;* and four bales, that they are coming in great force. *Bale* is akin to the Sansk. *bhâlas,* 'lustre,' Gr. *phalos,* 'bright;' *beacon* is a word of doubtful etymology, not found beyond the Teutonic languages.

An early instance of beacon-signals is found in the book of the prophet Jeremiah, in his call, in chap. vi. 1, to the people of Benjamin to kindle a fire-signal on one of their mountains: 'Set up a sign of fire in Beth-haccerem; for evil appeareth out of the north, and great destruction.' Another ancient instance of the use of a line of beacons occurs in the *Agamemnon* of Æschylus. The Greek commander is represented as communicating the intelligence of the fall of Troy to his queen, Clytemnestra, at Mycenæ, in the Peloponnesus. The line consists of eight mountains, and the news is supposed to be conveyed in one night from Troy.

In England the beacons were kept up by a rate levied on the counties, and had watches regularly stationed at them, and horsemen to spread the intelligence during the day, when the beacons could not be seen. They were carefully organised when the Spanish Armada was looked for. In 1856 an old beacon-work on Malvern Hill, which had done its part in former days in spreading the intelligence of the appearance of the Armada, of the Dutch fleet, and of the Young Chevalier, was lighted up in anticipation of the close of the Crimean war, and afforded an interesting amusement to scientific persons in estimating the distance at which the blaze could be seen from distant hills. Again, on the night of 21st June 1887, a multitude of jubilee beacons, throughout the length of the kingdom, received their signal from Malvern Hill, the time taken for its transmission thence to the Lake country being seven minutes.

Beacon, in maritime affairs, is an erection of stone, timber, iron, or concrete placed upon a rock or bank lying near the track of shipping, either on the open coast or in navigable rivers or estuaries, and is frequently equipped with a light or automatic acetylene signal. On the open coast, beacons are made of a sufficient size to give a chance of their being made out in the dark, and also of great strength to resist the shock of heavy breaking seas. When exposed to a very heavy sea, beacons are usually of stone or concrete and are built solid. Iron beacons are open pyramidal structures. One of the main columns of these large beacons (fig. 1) is provided with steps, so that any one cast upon the rock or reef may ascend to the cage on the top. This has often been the means of saving life. Fig. 2 represents the class of beacon sometimes used for rock foundations. It consists of strong cast-iron plates closely fitted and securely bolted together, the interior being filled with concrete, and is surmounted by an iron mast carrying a ball, triangle, diamond, or cone. Fig. 3 is a type used for sand-banks, and consists of a wrought-iron tube, 2 feet 7 inches in diameter, sunk into the sands, with a second length of tube added to carry the beacon above high-water level. The different types of beacons are almost innumerable, and are designed according to the situations for which they are intended.

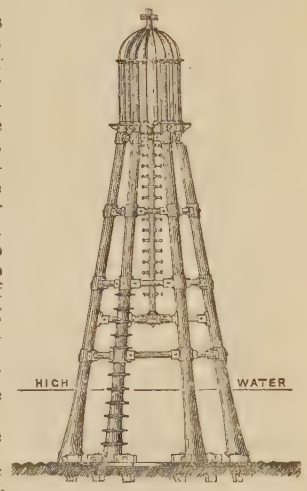


Fig. 1.—Elevation of a Cast-iron Beacon; total height above high-water, 36 feet.

In 1881 a beacon automatically lighted by compressed oil-gas was erected on the Clyde, and many of this type have since been installed in many parts of the world. The stone or concrete base is surmounted by an iron tank containing a supply of gas compressed to about seven atmospheres, and above is placed the lantern with dioptric apparatus. The light may be fixed or flashing, and is turned up automatically at night. Sufficient gas to last three months is supplied through a strong canvas and india-rubber tube from tanks on the attending vessel.

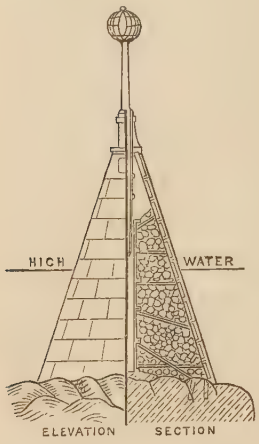


Fig. 2.—Total height above high-water, 26 feet.

In 1882 beacons were lighted automatically by volatile spirit on the Lindberg system, which burns day and night. The heat from the burner causes a fan with shades to revolve and produce occultations. The use of the volatile spirit was attended with danger, and the Benson-Lee lamp, which burned paraffin, was an improvement on the Lindberg system. A special burner was used, and the intensity of the flame was greater. Permanent wick lamps were introduced in 1891 in France, and Wigham lights have been adopted in many places. These beacons burn paraffin, and a fresh portion of wick is always being exposed to the flame. Their candle-power is small. Electricity has been successfully employed for beacon illumination, but is suitable only in special circumstances. Various automatic physical or chemical devices depending on the action of daylight have been tried for igniting and extinguishing lights, but have not proved of much practical importance.

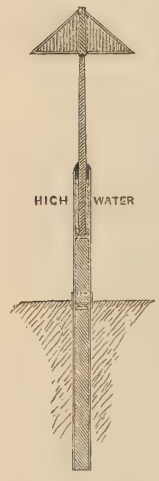


Fig. 3.—Section of Wrought-iron Cylinder Beacon; height above high-water, 30 feet.

Many important beacons are now illuminated by acetylene, which has proved well suited for unattended lights. The acetylene is generated on the carbide to water system, which generates the gas as it is required and is very economical, or cylinders containing the acetylene dissolved in acetone are supplied regularly. Garroch Head, on the Clyde, is an acetylene unattended light in conjunction with a hyper-radiant apparatus. See also LIGHTHOUSE; WIRELESS TELEGRAPHY, p. 670.

Beacon, a city of New York State, on the left bank of the Hudson, 58 miles N. of New York City, was incorporated in 1913 out of the villages of Fishkill Landing (or Fishkill-on-Hudson) and Matteawan. Fishkill Landing was in 1776-86 a great military depot. Pop. 11,000.

Beaconsfield, a little market-town of Buckinghamshire, 10 miles N. of Windsor, associated with the lives of Waller, Burke, and Lord Beaconsfield; pop. of urban district, 3600.

Beaconsfield, in the Cape Province, is a suburb of Kimberley.

Beaconsfield, BENJAMIN DISRAELI, EARL OF, statesman and novelist, was born 21st December 1804, in London; according to Mr Lucien Wolf, his father, Isaac D'Israeli (q.v.), was the son of a Benjamin who emigrated from Cento in Ferrara to London as a young man of eighteen in 1748, in connection with the Leghorn straw-bonnet trade, but became wealthy as a banker. The immigrant's father, Isaac Israeli in Ferrara, was the descendant of Levantine Jews: they do not seem ever to have lived in Venice. The future Earl, whose mother, Maria Basevi, was the descendant of a Jewish family which had been driven from Portugal by the Inquisition in 1730, was duly circumcised at the Spanish Synagogue in Bevis Marks, but in 1817, a boy of twelve, was baptised at St Andrew's, Holborn, with Sharon Turner for godfather. In 1821 he was articled to a solicitor; in 1824 entered Lincoln's Inn, and kept nine terms; for a time he tried stock-broking, and incurred a debt of £7000, which continued to harass him till his marriage. In 1826 he published the first part of *Vivian Grey*, not an over-bold forecast of his own achievements, so sparkling, arrogant, and egoistic, so full of piquant burlesque of the men and events of the day, that it straightway became the talk of the town, and gained him admission to the Blessington coterie. The second part, now little read, succeeded in 1827; the Gulliverian *Captain Popanilla* in 1828; and the high-flown *Young Duke* in 1831. In 1830–31 he took a twelvemonth's holiday in the Mediterranean, visiting Spain, Venice, Jerusalem (the homes of his ancestors), and describing his doings in the fourteen graphic *Home Letters* (1885), where we see him young, brilliant, foppish, affectedly affected, just as we know him in Maclise's portrait.

He returned to England to find the country in the throes of the Reform Bill; and in 1832 stood twice for Wycombe as an advanced Radical, backed by O'Connell and Joseph Hume. He failed both times, and failed again in 1835, when as a Tory he contested Taunton, quarrelling with O'Connell, and sending a challenge to O'Connell's son. Not until 1837, the first year of Victoria's reign, did he enter parliament, as member for Maidstone. Meanwhile he had published *Contarini Fleming* (1832), a 'psychological romance,' a 'story of the development and formation of the poetic character;' *The Wondrous Tale of Alroy* (1833), a stilted romance of the 12th century; *The Revolutionary Epick* (1834), a blank-verse rigmarole, the idea of which was conceived on the plains of Troy, and which justified tyrannicide in a passage expunged from the 1864 edition; *Vindication of the English Constitution* (1835); *Henrietta Temple* (1836), a 'love-story,' a lawless one; and *Venetia* (1837), where Byron and Shelley figure thinly disguised. His maiden speech, on Irish election petitions, was clever enough, yet was greeted with shouts of laughter, till, losing patience, he cried, almost shouted: 'I have begun several things many times, and have often succeeded at last; ay, and though I sit down now, the time will come when you will hear me.' In less than nine years that time did come. A reckless free-lance at first, persistent in little save hatred of the Whigs, he had risen since 1842 to be head of the 'Young England' party, when suddenly, from the hour of his savage onslaught on Sir Robert Peel in the Corn-Law debate of 22d January 1846, he became the real leader of the Tory Protectionist squires, though their nominal chief for two years was Lord George Bentinck (q.v.). To this period belong *Coningsby* (1844), *Sybil* (1845), and *Tancred, or the New Crusade* (1847)—a trilogy intended to set forth the origin and condition of political parties, the consequent condition of the people, and the duties

of the church as a remedial agency. The 'Young England' creed in fact, *plus* the 'Asian mystery.' As Chancellor of the Exchequer and leader of the Lower House in the brief Derby administration of 1852, he coolly discarded Protection, and came off on the whole with flying colours; still, his budget was rejected, mainly through Mr Gladstone's attack on it; and Mr Gladstone succeeded him, in the Aberdeen coalition ministry. In 1858 he returned, with Lord Derby, to power, and next year introduced a petty measure of parliamentary reform—his 'fancy franchises' bill—whose rejection was followed by resignation. For seven long years the Liberals remained in office; and Disraeli, in opposition, displayed talents as a debater, and a spirit and persistency under defeat that won for him the admiration of his adversaries. With his return to the post of Chancellor of the Exchequer, in the third Derby administration (1866), came the strangest episode in all parliamentary history. He introduced and carried a Reform Bill (1867), far more democratic, more sweeping in its character, than one just rejected by the Conservatives and malcontent Liberals. True, a tentative measure was first put forward, every whit as unsatisfying as its predecessor. It would not do; none saw that sooner than Disraeli himself; so throwing overboard dissentient colleagues, among them Lord Cranborne (future Marquis of Salisbury), he produced a bill giving household suffrage in the boroughs, and widely extending the county franchise. It was 'a leap in the dark,' Lord Derby's own phrase; the leap at anyrate was boldly taken. In February 1868 he succeeded Lord Derby as premier; but, in the face of a hostile majority, he resigned in the following December. On this occasion, Mrs Disraeli, in acknowledgment of her husband's services, was raised to the peerage as Viscountess Beaconsfield, an honour she survived only till 15th December 1872. The rich widow, fifty-six years old, of his first colleague, Mr Wyndham Lewis, she had married Disraeli in 1839. In 1870 appeared *Lothair*, a novel of which a reviewer in *Blackwood's* (Lord Salisbury, said rumour) observed that, 'on the whole, we had rather Mr Gladstone had written it.'

In 1874 Disraeli entered on his second premiership, the first two years of which were marked by the abolition of church patronage in Scotland, by an act to put down Ritualistic practices, and by one excellent measure, to protect British seamen against 'floating coffins,' which was forced on the government by Mr Plimsoll. But a spirited foreign policy was more to Disraeli's taste than humdrum domestic reforms. In 1875 he made Britain half-owner of the Suez Canal; and in 1876 he conferred on the Queen the new title of Empress of India, himself the same year being called to the Upper House as Earl of Beaconsfield. He had sat for Shrewsbury from 1841 to 1847, and thenceforward for Buckinghamshire. A free career was opened to his enterprise by the outbreak of insurrection in the Balkan Peninsula. Himself, he pooh-poohed the 'Bulgarian atrocities,' and was all for upholding Turkey as a bulwark against Russian aggression. When Constantinople seemed threatened, a British fleet was despatched to the Dardanelles, six millions were voted for military and naval purposes, and an Indian contingent was summoned to Malta. It was very magnificent; after all, though, it was not war, for the Berlin Congress (1878), which Lord Beaconsfield himself attended with Lord Salisbury, and which raised him to the zenith of his fame, gave back to Russia all she had lost by the Crimean war, and left Turkey the shadow of her former self. England's share was 'Peace with honour'—and with Cyprus, surrendered to us in an earlier secret engagement. The Afghan and Zulu wars combined with commercial depression and with troubles in Ireland to sicken the country of an 'Imperial' policy; and the general election of 1880 returning a large Liberal majority, the government resigned before the meeting of parliament. The ex-premier employed his leisure in publishing *Endymion*, like so many of his novels the story of a fortunate politician. On 19th April 1881 he died at his London residence in Curzon Street; and the terms of his will precluding a public funeral in Westminster Abbey, he was buried at Hughenden, near Wycombe.

'It was one of the first principles of Mr Vivian Grey that everything was possible;' none ever exemplified that principle better than Lord Beaconsfield. Member of an alien and persecuted race, a race without settled resting-place or civil rights, he rose to be champion of a proud landed aristocracy, the trusted friend of Britain's queen, an arbiter of Europe's destinies. We stand too near him now, rightly to determine his claim to greatness; but this one may safely say—for praise or blame, according to men's judgments—that, in almost everything he was the very opposite of his great adversary, Mr Gladstone. He was a master of epigram, a splendid debater, rather than an orator; *he* possessed that first-rate requisite of statecraft, lack of zeal; he was not one to be idolised or detested. Throughout he was faithful to his two leading beliefs—in the Jewish race, and in intellect (incarnate both in himself); throughout he was loyal, ay, as a Swiss guard, to his adopted country. It may be hard to decide whether he was a genuine Tory, whether he was not chiefly a hater of the Whigs. At least, he was a true leader, for he led the Tories always whither he would himself, and often whither themselves they would never have gone. In his famous Edinburgh phrase (1867), he 'educated' his party. The masses owe to him their first enfranchisement, and Britain by him was for a while rehabilitated as one of the Great Powers. His novels are as puzzling as himself. They are brilliantly clever, most witty and entertaining; but one vainly looks in them for humour, pathos, any of the deeper qualities. They will always, however, be read, for the key they furnish to their author's character, and for their caricatures of his contemporaries—of Brougham as 'Foaming Fudge' in *Vivian Grey*, and Canning as 'Charlatan Gas;' of Lord Lyttelton as the hero of *Coningsby*, Croker as 'Rigby,' Mr Gladstone as 'Oswald Millbank;' of Palmerston, in *Endymion*, as 'Lord Roehampton,' and so forth.

See GLADSTONE, YOUNG ENGLAND, HUGHENDEN, PRIMROSE LEAGUE, and works cited under those articles. See, too, *Lord Beaconsfield's Correspondence with his Sister, 1832-52* (1886); his *Selected Speeches*, edited by Kebbel (2 vols. 1882); an article on his novels, by Leslie Stephen, in the *Fortnightly* (1874); G. C. Thompson's *Public Opinion and Lord Beaconsfield* (1886); Sir W. Fraser's *Disraeli and his Day* (1891); and the Lives of him by John Mill (1863), O'Connor (hostile, 1879), Brandes (Danish, 1878; Eng. trans. by Mrs Sturge, 1880); Cucheval Clarigny (French, 1880), Ewald (1882), Hitchman (3d ed. 1885), Kebbel (1888), Froude (1890), Gorst (1900), Meynell (1903), Clarke (1926); Bryce's *Studies in Contemporary Biography* (1903); Lucien Wolf's introduction, rich in new facts about the Israeli family and the Jewish houses with which they intermarried, prefixed to the 1905 Edition of the works. Studies by Sichel (1904) and Maurois (trans. 1927) deserve mention; the biographies of Queen Victoria, Lord Granville, Gladstone, and especially of Lord Cranbrook (1910) shed much light on Beaconsfield and the history of his party; but the authoritative life is W. F. Monypenny's continued by G. E. Buckle (6 vols. 1910–20).

Beadle (O.E. *bydel*, modified by Fr. *bedel*), an inferior parish-officer chosen and appointed by

the vestry, was superseded under the parish council. The same name is applied to the messenger or crier of a court, to a university mace-bearer, and to a church-officer in Scotland.

Beads, a variety of personal ornament, made of glass, pottery, metal, bone, ivory, wood, jet, amber, coral, &c., and perforated so that they can be strung on threads and made into necklaces, bracelets, rosaries, &c., or worked on cloth as a kind of embroidery. Their use is of great antiquity, for they are found in the most ancient of the Egyptian tombs as decorations of the dead; and beads supposed to have been used in barter by the Phœnicians in trading with various nations in Africa are still found in considerable numbers, and are highly valued by the natives under the name of 'Aggry' beads. The origin of the name is unknown; but the coloured or variegated glass beads denoted by it are unquestionably of ancient manufacture; they are sometimes sold for more than their weight in gold. Ever since the 14th century, the manufacture of glass beads has been chiefly engrossed by the Venetians, and the glass manufacturers of Murano retain in large measure their ancient monopoly. Birmingham is the chief seat of the manufacture in England. The manufacture is curious: the melted glass, coloured or uncoloured, is taken from the pot by two workmen, who slightly expand the *gathering* of glass on the end of their blowing tubes. Each man then opens the hollow bulb of glass attached to his tube, and the two bulbs, while still soft and highly heated, are joined into one. This done, they walk rapidly away from each other in opposite directions, in a long shed like a small rope-walk, and draw the glass, which retains its tubular character given by the blowing, &c., into rods of great length, and often extremely small diameter. On cooling, which takes place very quickly, these long rods are broken up into short lengths of about a foot, and a small number of these shorter rods are placed on a sharp cutting edge, after being annealed, and are chopped into lengths. The roughly cut beads are next placed in an iron drum containing a mixture of plaster and charcoal dust. The drum is placed in or over a furnace, and a rotatory movement given to it. By this operation the short bits of tubes or perforated canes, which are softened by the heat, become rounded. The plaster and charcoal prevent the beads sticking together while soft. The beauty and infinite variety of Venetian glass beads are quite wonderful. They are sent to almost all parts of the world, but especially to African ports for the purposes of barter in the interior.

In Middle English *bede* signified 'a prayer,' and hence came to mean the small perforated balls of gold, silver, glass, ivory, or hard-wood used for keeping account of the number of prayers repeated. This curious transfer of the name from what is counted—the prayers—to that which is used to count them may be compared with that in Spanish, where *cuenta*, 'a bead,' is from *contar*, 'to count.' The old phrase 'to bid one's beads' means simply 'to say one's prayers;' and the modern phrase 'to tell one's beads,' literally 'to number one's prayers,' now means simply 'to say one's prayers.' A certain number of such beads strung on a thread makes a Rosary (q.v.). A *bedesman* or *bedeswoman* is one who prays for another. Persons of station and wealth in old times 'had regularly appointed bedesmen, who were paid to weary Heaven with their supplications.' Bedesmen frequently lived together in hospitals, and joined in prayers for their founders and benefactors, and hence *bedehouse* is synonymous with an almshouse. The King's Bedesmen in Scotland were licensed mendicants (see BLUE-GOWNS). A common form of signature at one time was: 'Your bounden bedesman,' or 'Your humble bedeswoman,' instead of the modern 'Your obedient servant.'

Beagle (probably from Fr. *bégueule*, 'wide-throat'), the smallest variety of hound, formerly much used in England for hare-hunting. It has now been almost wholly superseded by the Harrier (q.v.), to which its name is sometimes given. The true beagle is smaller than the harrier, ranging from 10 to 15 inches in height at the shoulder (below which height it is difficult to obtain well-developed specimens), stout and compact in make, with long pendulous ears, smooth-haired, sometimes dark brown, with a streak or spot of white about the neck, but generally marked in the same way as foxhounds or harriers. The beagle is prized for its keen scent and perseverance; and although much distanced by the hare at first, it is almost sure to kill it. It was customary in England, in former times, when beagles were used, to follow the chase on foot, a hunting-pole being employed to assist in leaping. The smaller breeds, though extremely delicate animals to rear, were preferred (see DOG).

Beak. See BILL.

Beale, DOROTHEA (1831–1906), principal of the Cheltenham Ladies' College for nearly half a century, wielded far-reaching influence on women's education. See Life by Miss Raikes (1908).

Beale, LIONEL SMITH (1828–1906), physician and physiologist, born in London, studied medicine at King's College, where he afterwards became professor (till his retirement in 1893). Besides the usual professional distinctions, he was F.R.S., and a member of scientific societies in Sweden, New York, Italy, and Belgium. He made numberless contributions to the *Lancet* and other special journals, and published books of great value on microscopy, kidney diseases, urinary deposits, the distribution of nerves to voluntary muscle, the structure and growth of the tissues. More important still are his *Protoplasm, or Life, Force, and Matter* (1870); *Life Theories, their Influence upon Religious Thought* (1871); *Life and Vital Action in Health and Disease* (1875); *Principles and Practice of Medicine in Slight Ailments* (1880).

Beam (O.E. *béam*, 'a tree'), any piece of wood, long like a tree. In the arts, the word has many special technical applications. It is the name, for instance, for part of a weaving-loom, of a balance, and of a stationary steam-engine. Beam in engineering is a strong stay of wood or of iron, for supporting lateral pressure. In ship-building it is applied to any of the transverse pieces of framing extending across the hull. In ship measurement it means breadth at the wales (see TONNAGE). The position of the beams, stretching across a ship at right angles to the keel, has given origin to many technical phrases used on shipboard. 'On the starboard beam' is applied to any distant point out at sea, at right angles to the keel, and on the starboard or right hand—as viewed from the stern—side of the ship. 'On the port beam' similarly applies to the left hand. 'On the weather beam' is that side of the ship which receives or is towards the wind. 'Before the beam' is the bearing of any object when seen more in advance than *on* the beam. 'Abaft the beam' is the reverse of the expression just noted. 'On her beam-ends' is applied to the position of a ship when so much inclined to one side that the beams become nearly vertical.

Beaming is the art of winding the web on the weaver's beam in a manner suitable for weaving with regard to firmness and evenness. It is to some extent a special employment, followed by workmen trained as beamers. See WEAVING.

Beam-tree, WHITE (*Pyrus Aria*, see PYRUS), a tree of 20–40 feet in height, a native of almost all parts of Europe and of corresponding climates in Asia, not uncommon in the mountainous districts of Britain, and frequently planted. It belongs to the Pomoideæ tribe of the family Rosaceæ, and used to be called Sorbus. It has a straight erect trunk, and a round or oval head; the leaves are ovate, cut and serrated (in some varieties deeply lobed), white and downy beneath; the flowers in large terminal corymbs; the fruit scarlet, of the size of small peas. The fruit is acid and astringent, but becomes agreeable when in a state of incipient decay; it is sometimes called Sorb or Service-berry, and resembles the true Service (q.v.) in quality, although much smaller. Beer is made of it by fermentation, and by distillation it yields a powerful spirit. The wood is very hard, and of a fine close grain, yellowish white, but easily stained, and capable of taking a high polish. It is much used in turnery in making handles to knives and forks, wooden spoons, parts of various musical instruments, surveyors' scales, and as a substitute for pear-tree and boxwood.

Bean is a term used to designate the seeds of various plants, but in England is generally applied to those of different species of Leguminosæ, as, for instance, the Common Bean (*Vicia Faba*), the French, Kidney, or Haricot Bean (*Phaseolus vulgaris*), the Molucca Bean (*Cæsalpinia Bonducella*), the Locust Bean (*Ceratonia Siliqua*), the Tonka Bean (*Dipteryx odorata*), and others. The term is also applied to the seeds of other plants widely different from each other and from the Leguminosæ. Of these, the Coffee tree; the Buckbean or Bogbean (Menyanthes); the Pitchurim Bean, the seed lobes of *Nectandra Puchury*, a relative of the Cinnamon and a native of tropical South America; St Ignatius' Bean, the seed of *Strychnos Ignatii* (see STRYCHNOS, IGNATIUS' BEANS), akin to Nux-vomica and itself strongly impregnated with the same deadly qualities; the Egyptian or Sacred Bean, the seed of *Nelumbium speciosum*, an aquatic plant held in veneration by eastern peoples; and the remarkable Calabar Bean (q.v.), *Physostigma venenosum*, are a few of the many instances of plants whose seeds are popularly designated beans.

The common bean is a valuable source of food to man and animals in most of the temperate climates of the globe. It is of eastern origin, and was cultivated by the Egyptians, the Greeks, and the Romans, who introduced it into Britain. The varieties are numerous, several of them being adapted to field cultivation. It is only used as human food in this country in the green or unripe state, but the ripe beans are valuable as food for pigs, horses, and cattle. The Greeks and Romans looked upon it as in some respects a sacred plant; in the Roman festival of Lemuralia (see LEMURES) the father of the family threw black beans over his head, repeating certain traditional words. Pythagoras forbade his disciples to eat beans. Beans were used by the ancient Greeks and others in voting by ballot, and a survival of this custom has lingered in the election of kings and queens at Twelfth Night and other feasts.

Beans of the ordinary kind belong to one species, *Vicia Faba*, of the family Leguminosæ. The common field varieties are the Tick Bean, the Scotch Horse Bean, the White Cluster, the Chatteris, and the Winter Bean. The garden sorts (other than French beans) are larger, such as Longpods and Windsors, and are generally known as 'broad beans'—the proverbial 'beans and bacon,' used as food, especially by the poorer classes in England. Beans grow best on the heavier classes of soils, and are usually planted after wheat or some other grain crop. The most common method of preparing the land is to plough in farm-yard manure early in autumn. The common concentrated manures, other than potash, give as a rule poor results. The seed, 2 bushels to 2½ bushels per acre, may then be drilled, or sowing may be delayed till February, when the land is found to be mellowed by the winter frosts; 3 bushels to 4 bushels of seed is then required of some spring-sown variety; 3 inches is a good depth for winter planting, and 2 inches in spring; 18 inches is a convenient distance between the rows, allowing space for thorough horse-hoeing and hand-hoeing, which is necessary, as the bean is a dirty crop. Beans may be broadcast and covered easily by harrowing, but the system, although simple, is objectionable, because the land cannot be properly cleaned when the crop is growing, and rather more seed is necessary. Sowing may be done every second furrow while the land is being ploughed, by means of Reeve's patent sower attached to the plough. This system is well suited to planting beans in autumn on land being broken up from grass. Autumn-sown beans grow the heaviest crop, if they escape severe winter frosts or frequent sudden change of temperature, which is apt to kill them; they are also ready to harvest in England with the wheat-crop, and can be cut without injury in bad weather during harvest, which is a great convenience, as well as a saving of expense. Spring-sown beans are rather later in coming to maturity, which means in England dead-ripe. In Scotland, beans are cut at an earlier stage, as the straw is at times used for horse fodder, being usually chopped and mixed with hay or oat straw. Ripened beans are ground into bean-meal, used as food for horses and cattle, and sometimes made into coarse bread. Beans take longer to dry after being put into sheaf than cereal crops, but are not so easily injured by bad weather; they are stacked in the same way as wheat, openings being left through the stacks for ventilation, to prevent moulding and injury to the seed. Beans are liable to be attacked by parasites, as Rust (*Uromyces Fabæ*), Powdery Mildew (*Erysiphe*), Downy Mildew (*Peronospora viciæ*), and Pod-blotch (*Ascochyta pisi*). If these diseases are largely developed, the crop is best ploughed down as a green-manure after being laid by rolling. The most serious insect enemy is the *Bean aphis* or Black Dolphin, which begins at the top of the plant, and multiplying into myriads, covers and destroys it. If taken in time, the crop may be saved by cutting off the tops; if not, it has to be eaten off green by sheep, or if not required for food, it may be ploughed in. The humble-bee pierces through at the base of the flower to reach the honey, but this is not now thought to be injurious.

The French Bean (*Phaseolus vulgaris*) and the Scarlet Runner (*Phaseolus multiflorus*) are grown in most English gardens, and the pods eaten as vegetables. They should be grown on rich land in a fine tilthy state; fresh manure is injurious to them. Scarlet runners are sown towards the end of May or early in June, in rows 2½ to 3 feet apart; French beans are sown in May, and up till the end of July. The runners continue to yield until autumn frosts set in, and French beans also, if sown late.

The beans grown in the United States are for the most part either haricots or closely allied kinds.

Bean-caper, a name applied to *Zygophyllum Fabago*, whose flower-buds are used in the East as a substitute for capers.

Bean Feast is a name for an annual dinner given by employers to their workpeople—possibly so called because *beans* or a *bean-goose* figured prominently in the repast.

Bean Goose. See GOOSE.

Bean King's Festival. See TWELFTH DAY.

Bear (*Ursus*), a genus of large mammals in the order Carnivora. They differ from the related cat and dog types in being much less markedly carnivorous in habit and structure.

General Characters.—The stout body with thick legs and very short tail is covered with long shaggy fur; the entire under surfaces of the naked palms and soles rest on the ground in what is termed plantigrade fashion; the long claws are comparatively blunt, and are not retractile; the more or less elongated head, with short rounded hairy ears, runs out into a blunt somewhat hog-like snout; the bony external ear-bulb (tympanic bulla), so conspicuous on the skulls of most carnivores, is here rudimentary; the teeth have the same number and arrangement as those of the dog, but in association with the omnivorous and largely vegetarian diet the canines remain less developed, the special cutting teeth (sectorials) less sharp, and the molars have flattened and tuberculated grinding surfaces. Compared with the higher carnivores, bears are slow and less aggressive, relying more upon strength than cunning, and more or less contented with vegetable food. Though clumsy and heavy animals, they are thoroughly active, and some of them swim and climb with much agility. Most of them sleep through the winter, when their food is usually scarce, and it is at this season that the young cubs are born.

History.—In the earlier ages of civilisation bears bulked much more largely both in the imaginative and the practical life of men. In Greece the bear was king of the woods and sacred to Artemis, though none the less a favourite object of the chase. He is a prominent figure in the mythologies and hero-tales of Northern Europe; and the same mixed reverence for a formidable antagonist is exhibited still by the North American Indians, who excuse themselves for eating it by an elaborate preface of compliment and respect. Bears used to be common beasts of chase in Europe, as many personal and local names abundantly testify. Large numbers were imported to Rome from various quarters, especially towards the decline of the empire, and supplied abundant material for the cruel conflicts of the amphitheatres. It is indeed on record that as many as a thousand bears were on one occasion exhibited. Bear-baiting prevailed to a much later date, and even in the time of Queen Elizabeth and her successor it was a recognised fashionable amusement to go to the bear-gardens, and see the victims worried to death by dogs. The name *Bruin* playfully given to bears is derived from the old poem *Reynard the Fox* (q.v.), where the bear has the name of 'Brown'; 'bruin' being the Dutch form of 'brown.'

Distribution.—The genus, though not a large one, is widely distributed in cold and temperate regions, and in the secluded uplands of some warmer countries. About ten species frequent various parts of Europe, Asia, and North America, while the African Bear (*Ursus crowtheri*) of the Atlas Mountains, and the South American Spectacled Bear (*U. ornatus*) of the Andes, are the only two representatives known to occur on these two continents. Their geographical range has been gradually becoming more and more restricted.

From the Pliocene strata of Europe and the deposits of the Siwalik Hills, two extinct species of bear have been dug up (*U. arvernensis* and *U. etruscus*). The Post-pliocene European caves are rich in remains of the Great Cave-bear (*U. spelæus*), along with those of the still abundant Grizzly. None of the above extinct forms differ markedly from existing species, but related genera like Arctotherium and Hyænarctos lead back to such a primitive form as *Amphicyon*, which is supposed to be at 'the converging point of the dog and bear family lines.'

Different Forms.—The common Brown Bear (*Ursus arctos*), a variable species, inhabiting Europe and Asia, and regarded by some as identical with the black bear of North America. It used to be

Common Brown Bear (*Ursus arctos*).

found in Britain, but seems to have been exterminated in Scotland about the end of the 11th century. It measures about 6 feet in length, and stands 3 feet or so high at the shoulders. The long fur is predominantly dark brown, but very variable in colour. They eat all sorts of things—roots, berries, vegetables, ants, honey, fish, &c., and when these fail, other quadrupeds both small and large. The males and females only meet at pairing time, and the males are said to be more inclined to eat the cubs than in any way to care for them. The mother bear, on the other hand, is devotedly fond of her offspring, is ready to defend them at all costs, and when in their company is a most dangerous animal. In spite of the shuffling awkward gait, the brown bears are agile animals, climbing and swimming with ease, and able to attain a considerable speed in running. Their senses of smell and hearing are very acute. When hunger prompts them to attack large quadrupeds, their usual method is to hug their prey within their powerful arms. At the beginning of winter, when food is becoming scarce, but before the bear has had time to get out of condition, it seeks some sheltered nook in a cave or hollow tree, and after making itself snug and comfortable, falls into a winter sleep. During winter the female gives birth to from one to three cubs, which are cherished in the lair until spring. They remain blind for about a month, and are suckled for other two. When the bears reappear after their long rest they are thin and weak, and not unnaturally voracious. They attain a considerable longevity of 40 to 50 years. When kept in captivity they seem apt to sink into a phlegmatic mood, to which they appear to have a natural predisposition; they may, however, be taught to dance clumsily on their broad soles, and are said to have a good ear for music. Numerous stories are told, moreover, of their affectionate disposition when properly treated, though they are generally soured and crossed by confinement. The skins are greatly valued, the flesh of the cubs is very palatable, bears' paws form a

special delicacy, and the fat or bear's grease is a well-known unguent. In Kamchatka, different parts of the bear, which is very common, are used in a great variety of ways—e.g. the intestines for window-panes.

The American Black Bear (*Ursus americanus*) is regarded by some as merely a variety of the former, from which it differs only in a few trivial characters, such as blacker fur, more slender snout, more convex forehead, and the like. It inhabits North America, is even more thoroughly vegetarian than the Eurasian form, and much less dangerous than the Grizzly. If food be abundant in the late autumn, and the bears in consequence in good condition, they fall into a winter sleep in an often snow-covered hiding-place. They are reverenced or almost worshipped, but at the same time hunted and eaten by the Indians. The skins are largely utilised for caps, rugs, &c. Closely related to the above forms are the Syrian Bear of Lebanon and the Palestine mountains, and the Indian White Bear of the Himalayas. The former species (*U. syriacus*) is repeatedly mentioned in the Bible, and was much used in the Roman exhibitions. The Himalayan Bear (*U. isabellinus*) is probably only a variety.

Quite distinct from the above is the Grizzly Bear (*U. horribilis*, *cinereus*, or *ferox*) of North America (from Mexico to 61° N.), a very large, strong, and fierce animal, chiefly at home on the Rocky Mountains. Though the characteristics of this powerful species are well marked, it was not till the explorations of Lewis and Clarke in 1802–6 that it was known to be a distinct type. The dark brown fur has a good deal of gray about the head, the ears are short and conical, the forehead broad and flat, the tail extremely short, the claws long, curved, and whitish. The adult Grizzly cannot climb trees. It is larger and stouter than the brown bear, more markedly carnivorous, and a very much more formidable beast of chase. It is said to be able to drag a buffalo carcass along, and is by far the most ferocious of bears. Attacked by man, it will pursue the assailant till the last. It is extraordinarily tenacious of life. A case is authenticated of a Grizzly receiving ten balls in its body, four of which passed through its lungs and two through its heart; it nevertheless swam half a mile, and did not succumb for twenty minutes. The skin is less valuable than that of the brown and black bears. The Indian or Tibetan Black Bear (*U. tibetanus*) and the Japanese species (*U. japonicus*) do not differ markedly from any of the preceding.

Somewhat different from the bears above described are a few forms for which separate genera are often erected. The Malayan Sun Bear (*Helarctos* or *Ursus malayanus*), inhabiting the Malay Archipelago, has a short, broad head, long extensile tongue, short, smooth, black fur, and remarkably long claws. Its maximum length is about 4½ feet. It does great damage to the cocoa-nut plantations. The Sloth Bear (*Melursus* or *Ursus labiatus*), which is still more divergent, inhabits the mountainous regions of Southern Asia and Ceylon. The first upper front tooth is absent or shed very early, and the other teeth are very small. Sloth bears are clumsy, uncouth animals, 5 to 6 feet long, with shaggy black fur, and with prolonged snout and lips which are utilised in sucking white ants out of their nests. They are for the most part contented with insects, honey, and vegetables, but often do considerable damage to the plantations. They admit of being readily tamed, and are often led about by Indian jugglers. The Spectacled Bear of the Peruvian and Chilean Andes (*Tremarctos* or *Ursus ornatus*) is a small form about 3½ feet long, with black fur, and curious light-coloured rings round the eyes. A closely related species inhabits the island of Formosa.

The Polar or White Bear of the Arctic regions (over the whole Polar zone) (*Thalassarctos* or *Ursus maritimus*) has a comparatively narrow head, a pointed snout, small rounded ears, and a long neck.

Polar Bear (*Ursus maritimus*).

The grinding teeth are smaller and narrower than usual, and the soles of the feet more hairy. They feed principally on fish and seals, rarely attacking terrestrial quadrupeds, and not despising vegetable food in summer. They are the largest bears, often measuring 9 feet in length, and are proportionately strong. They move heavily, but not slowly over the ice, and are able to swim with much swiftness and endurance. They are more aquatic than any of the other species. Tales of polar explorations seem to show that the white bear is more aggressive towards man than any of the other species, and it is certainly the most carnivorous type. As food is abundant in winter, the males at least do not seem to hibernate. The she-bears, however, find sheltered nooks in the autumn, and bear one to three cubs in midwinter. The dwellers in the far north are fond of hunting the polar bear, and use the flesh for food, the fat for burning and curative purposes, the sinews as twine, and the skin for clothing. The genus *Ailuropus* is of some importance as a connecting link between the bears proper and other carnivores like the Panda (q.v.) See CARNIVORA.

Bear, BERE, or BEER. See BARLEY.

Bear, GREAT and LITTLE. See URSA MAJOR and MINOR.

Bear-baiting. In different countries, bears were formerly made objects of cruel sport, by being baited with dogs. In England it was a favourite amusement as early as the reign of Henry II., whilst at a later period a 'royal bear-ward' was an officer regularly attached to the royal household. The sport is frequently alluded to by Shakespeare and Ben Jonson, and it was not only encouraged by Queen Elizabeth, but it was placed under the particular patronage of her majesty. An order of the Privy-council, in July 1591, prohibited the performance of plays on Thursdays, because on Thursdays bear-baiting and the like pastimes had been usually practised; and an injunction to the same effect was sent to the Lord Mayor, wherein it is stated 'that in divers places the players do use to recite their plays to the great hurt and destruction of bear-baiting, and the like pastimes, which are maintained for her majesty's pleasure.' The queen's bears were kept at the Paris Gardens,

Bankside, Southwark, close to the river, named after Robert de Paris, a nobleman of the time of Richard II. Every town of importance at that time kept its bear, bear-ward, and pack of dogs. It is hardly necessary to add that bear-baiting, like bull and badger baiting, has long been unknown in England, having been prohibited by parliament in 1835.

Bearberry. The RED BEARBERRY (*Arctostaphylos uva ursi*) is a small trailing evergreen shrub, common in the Highlands of Scotland and in the Hebrides, and ranging over northern and alpine Europe, Siberia, and North America. It grows in dry, heathy, and rocky places. The flowers are in small crowded terminal racemes, of a beautiful rose colour. The berries are austere and mealy; they are said to be largely eaten by bears in northern regions. Grouse also feed on them. The dried leaves are used as an astringent and tonic medicine, especially in chronic affections of the bladder; but those of the Cowberry (*Vaccinium vitis idæa*) are substituted for them.—The BLACK BEARBERRY (*A. alpina*), of similar distribution, is a small trailing shrub, with black berries about the size of a sloe, which are relished by some.

Beard. The hair of the beard, moustache, and whiskers, is usually, though not always, of the same colour as the hair of the head, but somewhat shorter, stronger, and more wiry; it is invariably the colour of the hair on the eyebrows. The beard is the distinctive sign of manhood. In women, an incipient beard sometimes appears in the later years of life. Instances also occur of women with a beard almost equal to that of the male sex, the most celebrated 'bearded lady' being Margaret of Parma, regent of the Netherlands (1559). The beard is generally luxuriant in persons of the Slavonic and Celtic races. The aborigines of America, who are naturally almost beardless, make themselves entirely so by plucking out the hairs of the beard. In early times the beard was considered by almost all nations a sign of strength and an ornament of manhood, was carefully cherished, and even regarded as sacred. Among the Turks, Arabs, Persians, and many other nations, the removal of the beard was, and is yet to a very great extent, regarded as a severe punishment, and an extreme degradation. The Moslems, who are accustomed to swear by the beard of the prophet and by their own, carry combs constantly about with them for the purpose of dressing the beard. It is common to do so immediately after prayers, the devotee remaining on his knees during the operation. The hairs that fall out are then carefully picked up and preserved for entombment with their owner when he dies; frequently he himself deposits them beforehand in his destined tomb. The ancient Jews did not dye their beards, but the practice was common among the Arabs and Persians. The Arabs dyed the beard red, not only because dye of that colour (being merely a paste of *henna* leaves) was easily obtainable, but because it was an approximation to golden yellow, the colour recommended by their prophet Mohammed, who hated black, the colour the Persians preferred. The red beards of some of the suite of the sultan of Zanzibar caused no little surprise on the occasion of his visit to England in 1875. The Persian kings are said to have interwoven their beards with gold thread. It is customary among the Turks to anoint the beard with perfume, and to smoke it with incense. The Jews also anointed their beards. The Moslems commonly clipped their whiskers, the Jews did not. The Egyptians shaved their beards except in time of mourning, when they let them grow. They sometimes, however, wore false beards of plaited hair, varying in form and length with the rank of the wearer. In Greece the beard was universally worn till the time of Alexander the Great, who ordered shaving, that the beards of his soldiers might not be laid hold of by their enemies in battle. Shaving was introduced among the Romans about 300 B.C. Pliny says Scipio Africanus was the first Roman who shaved every day. Subsequently, the first day of shaving was regarded by the Romans as the entrance upon manhood, and celebrated with great festivities. Under Hadrian, the beard was again allowed to grow, and this fashion prevailed till the time of Constantine the Great, when it was discontinued. Amongst the ancient West Goths and Burgundians, the removal of the beard was a sign of servitude, or loss of honour; nobles wore long beards. In the time of Charlemagne, the upper classes wore at most a moustache, while the common people cherished a full beard. The wearing of the beard, shorter or longer, was usual amongst the gentry from the 10th till the 12th century; subsequently throughout the middle ages the higher ranks shaved closely. Peter the Great compelled shaving in Russia by imposing a heavy tax upon the beard, and further, by having the beards of all whom he found wearing them plucked out by the roots, or shaved with a blunt razor. The beard was commonly worn in France till the time of Louis XIII., when, because the monarch was young and beardless, the fashion changed at the court and throughout the kingdom. A similar change took place in Spain on the accession of Philip V. The English wore beards for a considerable time after their invasion of Britain; and the beard appears to have been general among the people at the time of the Norman Conquest. But the Normans not only shaved themselves, but compelled the conquered to do so likewise; and many of the English chose rather to leave the country. It would appear, however, from sculptures on the tombs of kings and nobles, that not very long after the Conquest some of the Normans adopted the custom they had prohibited among the vanquished. Edward III. is represented on his tomb in Westminster Abbey with a very long beard. In the time of Elizabeth, beards were of the most varied and fantastic cut; and Taylor the 'Water-poet' satirises the extravagance of beards prevailing in that and the succeeding reign.

Under Charles I. were worn the moustache and peaked beard, familiar through Vandyke's portraits; in Charles II.'s reign moustaches only were worn; and the practice of shaving the whole face soon became general all over Europe. Among the clergy, too, there has been great diversity in the matter of beard-wearing at different times and in different countries. One is apt to associate the beards of the reformers with their Protestant tenets; but, as a matter of fact, all the popes were bearded from 1523 to 1691. Nowadays the clergy of the Eastern Church go bearded; of the Western, closely shaven. In the Anglican Church many of the inferior clergy have long worn beards; but Bishop Ryle of Liverpool (1880) was the first bearded prelate for many a day. The Worcestershire militia claims to have been the first English regiment to adopt the moustache, in 1798, and to have borrowed the idea from the Austrian service. The growth of the full beard dates in France from the capture of Algiers (1830), in England from the Crimean war (1855). In France during the second empire, moustache and 'imperial' after the manner of Napoleon III. were usual. For a good while a beard was regarded by some of the continental governments as a badge significant of democratic sentiments, and as such was interfered with by police regulations. Certain nations, such as Poles and Hungarians, usually grow only moustaches. Side-whiskers were long an especially English

characteristic. Physicians recommend that the beard should be allowed to grow on the chin and throat in cases of liability to inflammation of the larynx or of the bronchiæ; and moustaches and whiskers are reckoned useful for prevention of toothaches and nervous diseases of the face. The beard is itself liable to the same diseases as the hair of the head, and to a peculiar disease (*mentagra*) occasioned or kept up by shaving, and consisting in a bark-like exudation from the inflamed sebaceous glands of the hair. See BARBER, HAIR. —For the beard of grasses, see AWN.

Beard, GEORGE MILLER, an American physician, born May 8, 1839, in Connecticut, studied at Andover and Yale, and served during the war as an assistant-surgeon in the navy. In 1866 he settled in New York as a specialist in nervous diseases, on which he lectured for some years at the university. Besides suggestive books on eating and drinking, stimulants and narcotics, hay fever, sea-sickness, and sexual neurasthenia, Beard produced a valuable work on *American Nervousness* (1881), basing his results on the climate and mode of life in America. He died 23d January 1883.

Beard Moss. See USNEA, BROMELIACEÆ.

Beardsley, AUBREY, a remarkable designer in black and white, born at Brighton in 1872, for a while was in an architect's, and then in a fire-insurance office. He began working for the illustrated papers in 1892, and became well known through his illustrations in the *Yellow Book* (1894, &c.) and a long series of publications. He died, a Catholic since 1897, on the 18th March 1898. He sometimes defied proportion and perspective as well as his *bête noire*, convention, but in his best work, which was ornamental rather than illustrative, showed extraordinary skill in black and white. See books on him by Symons (1898), R. Ross (1908), the edition of Ben Jonson's *Volpone* illustrated by him with a eulogy by Ross (1898), books of his *Early Work* (1899), *Later Work* (1900), *Unpublished Work* (1925), and a volume of his Essays (1903).

Beardsley, EBEN EDWARDS (1808–91), born at Stepney, Conn., became rector of an Episcopal church in New Haven, and wrote on the church history of Connecticut and of the Episcopal Church in the United States—one of his works being the life of Bishop Seabury.

Bearer Subdivision is a part of the military organisation known as a Field Ambulance (see AMBULANCE), each of which has three. Each subdivision has a personnel of about 40 of the Army Medical Corps, including an officer, a sergeant, and 39 privates, providing 6 stretcher squads of 6 bearers each, with 3 or 4 ambulance-wagons. Drivers are supplied by the Army Service Corps. Complementary to each Bearer Subdivision is a Tent Subdivision, with personnel of from 60 to 70.

Bearing, of a ship at sea, is the direction in which she sails, in reference to the points of the compass. On shipboard, seamen often conveniently refer the bearing of another ship or of an object on shore not to the points of the compass, but to the line followed at the moment by their own ship's keel. Thus the bearing of the distant object may be *ahead*, *astern*, on the *starboard bow*, on the *port quarter*, &c.

Bear Lake, GREAT, in the north-west of Canada, is the most northerly of that series of fresh-water seas—Huron, Superior, Winnipeg, Athabaska, Great Slave, Great Bear—which mark a continuous depression in the middle of the continent. Lying 246 feet above sea-level, Great Bear Lake is irregular in shape, with a surface estimated at 11,821 sq. m. It sends forth a river of its own name to the Mackenzie. As the Arctic circle passes over it, the climate is severe.

Bear-leader. In former times, bears were led about with a chain, muzzled, and made to dance or stand on their hind-legs for popular entertainment; small dancing-dogs being usually added, for the sake of attractiveness. From this old practice has been taken the phrase 'bear-leader,' used jocularly to signify a discreet person who takes charge of a youth of rank on his travels to see the world.

Béarn, formerly one of the thirty-two provinces into which France was divided, and now forming the greatest portion of the department of Basses-Pyrénées. The inhabitants are chiefly Gascons with a strong infusion of Basque blood, and they speak a characteristic Gascon dialect—which is practically a kind of Provençal (q.v.). Béarn was a portion of Aquitania under the Romans, and after the downfall of that empire, under its ruling dukes it was a country of considerable importance. From the intermarriage of the ruling family, the Counts of Foix, with that of Navarre, sprang the French monarch Henry IV., who, because he was born and brought up in Béarn, was derisively called Le Béarnois. When he ascended the throne of France, Béarn, of course, virtually became a part of that country, but was only formally incorporated with it in 1620 by Louis XIII.

See Rivarez, *Chansons et Airs populaires de Béarn* (1844); Bourdeau, *Ancienne Gascogne et Béarn* (1862); Cadier, *Les États du Béarn* (1887); Lespy, *Proverbes du Béarn* (1893); also the articles BASQUES, GASCONY.

Bear River, a stream of Utah, U.S., which rises in the Rocky Mountains to the E. of Salt Lake, flows NW. into Idaho, then bends round and again returns into Utah, falling into Great Salt Lake. The Bear and Steamboat springs on its banks, in Idaho, are impregnated with magnesia and other minerals. Coal is found at the crossing of the Central Pacific Railroad.

Bear's Grease. Under this name there are sold pomades, represented to be of great efficacy in nourishing and promoting the growth of hair. These so-called preparations of bear's grease are for the most part composed of purified beef-marrow, hog's-lard, or fat of veal, and spermaceti, along with almond oil, and some scenting ingredients. See HAIR.

Beás, an Indian stream, one of the 'Five Rivers' of the Punjáb, rises in the Snowy Mountains of Kúlu, at an altitude of 13,326 feet above sea-level. It flows through the Kángra Valley, and generally SW., to the plains of the Punjáb, where it joins the Sutlej at the south-western boundary of Kapurthala State, after a course of 290 miles.

Beast, NUMBER OF THE. See APOCALYPTIC NUMBER.

Beast-fables, stories in which animals play human parts, a widely-spread primitive form of literature, often surviving in more or less developed forms in the more advanced civilisations. No better example of its simplest form could be found than those stories of the negroes within the Southern States of America, which, through Harris's *Uncle Remus*, are now so well known to the reading public in England as well as America. The primitive natives of many parts of Africa still tell stories similar to these, and indeed they have acquired no very exalted notions of the inherent superiority of the human race, and admit without difficulty that the wisdom of the lower animals may be equal to their own. 'It is not a little curious,' says Sayce, 'to find that the chief home of the beast-fable should be Africa, and especially those backward tribes of Southern Africa whose

languages contain in their clicks the bridge that marks the passage of inarticulate cries into articulate speech. It seems as if the same conservatism which has preserved the animal sounds out of which language was developed, has preserved also a sympathy with the animal world, a memory of the close ties which unite us with it.' A striking instance of the naturalness of this form to the negro mind is seen in the fact that when the Vái tribe of Mandingan negroes in Liberia had developed a system of writing (1830–40), their first essays in composition were rude fables about beasts. Even in the advanced civilisation of ancient Egypt, the beast-fable held an important place; indeed, it is not improbable that here it may have made its first appearance, and that its popularity may have been in large measure due to the deep respect of the ancient Egyptian for the unerring instinct of animals, which went side by side with the animal-worship that was so marked a characteristic of his religion. We find the 'Lion and the Mouse' in a papyrus dating from 1200–1166 B.C.—the days of Rameses III. (Rhampsinitus) or Hak On—not as a rude and early attempt, but in a finished form postulating a much more ancient origin. Sir Richard Burton points out that from Kemi, the Black-land, it was but a step to Phœnicia, Judæa, Phrygia, and Asia Minor, whence a ferry led over to Greece. Here the apologue found its populariser in Aisōpos, whose name, involved in myth, possibly connects with Aithiops. The fabulist's era may be taken as contemporary with Solon (570 B.C.), about a century after Psammetichus (Psamethik I.) threw Egypt open to the restless Greek. From Africa, too, the fable would spread eastwards, and find a new home in the second great focus of civilisation in the Tigris-Euphrates Valley; while in later days the conquests of Alexander and his successors Hellenised the eastern world, and carried with their victorious arms every form of literature that had been fostered by the western peoples. Whether or no we can accept this historical chain as explaining the transmission of the beast-fable, at least it must be admitted that it is highly reasonable as a theory, and finds here and there strange verification. Even the Lokman of Arabian and Persian fable has a more than superficial likeness to the Æsop of history in his ugliness and his servile condition.

To us the allegory in such fictions seems fundamental, but it was not so to the primitive mind. To the savage the beast-fable is not nonsense, for he ascribes to the lower animals the power of speech and a nature resembling his own, and believes readily in transmigration and metamorphosis. Savage mythology is full of metamorphoses, and these happen still as contemporary events in Samoa and Sarawak. The belief in the affinity between man and animals in which primitive man has so nearly anticipated the would-be conclusions of certain advanced evolutionists belongs even now to half mankind, and most students of comparative religion maintain that in the other half the worship of animals represented an earlier stage in the religious evolution. The Australians, Kamchadales, Polynesians, North-American Indians, Basques, and Transylvanian Gipsies at the present day tell beast-fables into which as yet no moral lesson has entered. They have not yet reached the stage which Grimm, with the contempt of the true folklorist, describes as 'fables thinned down to mere moral and allegory,' and 'a fourth watering of the old grapes of an insipid moral infusion.' Among the Zulus and Hottentots we find the same stories, informed with the true Æsopic humour. Indeed it is, as has been seen, among the Bushmen, that pure beast-fables still exist in their simplest and fullest form, and it is among them also that the art of drawing animals with considerable skill has been cultivated from time immemorial, as is evidenced by the rock-paintings of Southern Africa. In the Bushmen's beast-fables, the hare, as among the American negroes, the rabbit, plays much the same clever part as the fox in our European examples, and 'fables that illustrate the superior cunning of the hare can be traced,' says Sayce, 'from the Bari of Central Africa through Malagasy, Swahili, Kafir, and Hottentot, back to the Bushmen, where he is associated with what Dr Bleek calls "a most unpronounceable click," not otherwise found in the language.' But indeed we find the beast-fable in all parts of the world. Thus in Mr Gill's *Myths and Songs from the South Pacific*, a shark speaks and acts like a man, and Mr Ridley tells us the Australians ascribe human speech and action to the pelican and the musk-duck. The question need not now be raised whether these fables are really an indigenous native literature—it is sufficiently striking and significant to find here stories almost identical with those found among widely different people in widely distant regions. In our civilised world the animal-story lingered long after the moral beast-fable had become predominant. The crows of Æsop had croaked their wisdom through the medium of Babrius and Phædrus for a thousand years before the genuine beast-epic reached its highest development in *Reynard the Fox* (q.v.), belonging to the 12th century, but containing materials of a far earlier date. It is not a didactic poem, nor essentially even a satirical poem. Its charm lies in the admirable manner in which the characters of the various animals are sustained. Its influence in the middle ages may be partly understood from the fact that our common names *Reynard*, *Bruin*, and *Chanticleer* were originally the names of the characters in the great beast-fable.

Beast-fables, resembling more particularly the African, have been found in the cuneiform inscriptions of Babylonia. Four excellent examples have been preserved among the fragmentary records of Assur-bani-pal's library: the first narrating the actions of an eagle and a serpent; the second, of a fox and jackal; the third gives a discussion between a horse and an ox; while in the fourth a calf speaks. Jotham's story in the Book of Judges makes the trees talk to one another. So in the Izdubar legends of Babylonia, the trees answer Hea-bani.

Stories of the same nature are equally common farther east in Asia. Perhaps no book has been more widely popular than the fables of Bidpai (q.v.), translated first into Pehlevi or ancient Persian from an old Indian original, in part represented now by the Panchatantra (q.v.). The Indian fables differ from the Æsopic in this: in the former, animals act as men in form of animals; in the latter, animals are allowed to act as animals. Benfey ascribes this peculiarity of Indian conception to the belief in Metempsychosis (q.v.), and the exclusively didactic nature of Indian tales. All tales, therefore, in which animals play the part of human beings are Indian. As to the ultimate origin of beast-fables, Benfey's conclusion is that most fables about animals are western or Æsopic; that, on the contrary, the tales are Indian. In all our folk-tales the relations between the heroes and animals are usually kind or helpful. Nothing is more common than for the hero to do some kindness to a suffering animal, who afterwards shows his gratitude by some signal service to his benefactor at the moment of his own perplexity. Beasts and birds often carry grave secrets to favoured individuals, and so save them from unhappiness and

danger. If this feeling for animals is not of Buddhist origin, it is at least, as Cosquin points out, a prevailing Indian idea, and is certainly derived from the belief in metempsychosis, which effaces the distinction between man and the animal, and which in every living thing sees a brother. Benfey throws out the hint that metempsychosis may have come from Egypt. It does not occur in any of the Indo-European races save the Indians themselves, and undoubtedly intimate relations once existed between the Indus and the Nile. The Phœnicians were active intermediaries of commerce, and just as it is very probable they carried writing to India, they may have carried and re-carried many other elements of civilisation. Sir Richard Burton will have none of Benfey's refinement of distinction between the Æsopic and the Hindu apologue, and adds: 'The essence of the beast-fable is a reminiscence of *Homo primigenius*, with erected ears and hairy hide, and its expression is to make the brother brute behave, think, and talk like him with the superadded experience of ages. To early man the "lower animals," which are born, live, and die like himself, must have seemed quite human enough and on an equal level to become his substitutes. The savage, when he begins to reflect, would regard the carnivore and the serpent with awe, wonder, and dread; and would soon suspect the same mysterious potency in the brute as in himself: so the Malays still look upon the Uran-utan, or Wood-man, as the possessor of superhuman wisdom. The hunter and the herdsman, who had few other companions, would presently explain the peculiar relations of animals to themselves by material metamorphosis, the bodily transformation of man to brute, giving increased powers of working him weal or woe. A more advanced stage would find the step easy to metempsychosis, the beast containing the Ego (*alias* soul) of the human: such instinctive belief explains much in Hindu literature, but it was not wanted at first by the apologue.' There are many apologues in the *Arabian Nights*, but these are much longer and more involved in circumstance than the straightforward fables of Æsop, with their single event and simple moral. But these, despite their monumental antiquity, Burton regards as the offspring of a comparatively civilised age, when a jealous despotism or a powerful oligarchy threw difficulties and dangers in the way of speaking plain truths. He adds: 'A hint may be given, and a friend or foe can be lauded or abused as Belins the sheep, or Isengrin the wolf, when the author is debarred the higher enjoyment of praising them or dispraising them by name. And, as the purposes of fables are twofold, the speaking of brute-beasts would give a piquancy and a pleasantry to moral design as well as to social and political satire.' The danger of attempting openly to administer plain reproof to absolute Asiatic potentates may well have led to the invention of fables in which the lessons intended to be imparted were veiled under ingenious fictions of animals. Mr Clouston quotes the following story from an oriental historian of a tyrannical monarch having been reclaimed by such means. 'A wise and prudent vazír once related the following fable to his royal master: There was an owl in El-Basra and an owl in El-Mosul. And the owl of El-Basra said to the other one day: "Give me thy daughter in marriage to my son." Quoth the owl of El-Mosul, "I consent, on condition that thou give me as her dowry a hundred ruined villages." "That," replied the owl of El-Basra, "I cannot do at present; but if Allah spare the sultan another year, I will do what thou requirest." The sultan, deeply impressed by this simple fable, at once caused all the ruined towns and villages to be rebuilt, and henceforward studied to promote the well-being of his subjects, and to render his rule easy and acceptable to them.'

See Benfey's masterly introduction to his translation of the *Panchatantra* (Leip. 1859); Tylor's *Primitive Culture* (1871); Sayce's *Science of Language* (2d ed. 1883); Keith-Falconer's *Fables of Bidpai*, with its learned introduction (1885); Clouston's *Popular Tales and Fictions* (1887); Cosquin's *Contes populaires de Lorraine* (2 vols. 1886); the 'Terminal Essay' of Burton's *Thousand Nights and a Night* (vol. x. 1886); Leclerc's *Bestiaire* (ed. Reinsch, 1890); Goldstaub and Wendriner's Venetian *Bestiarius* (1892); Nover's *Thiersage* (1893); and books cited at ANIMALS (WORSHIP OF), FABLE, FOLKLORE, REYNARD THE FOX, and TOTEM. Also compare Rudyard Kipling's own beast-fables in his *Jungle Books* (1894 and 1895).

Beat is a phenomenon in sound caused by interference, and is of practical importance in the art of tuning instruments; see the article SOUND. The word is also used for the signal given by the hand or foot of the conductor of a musical performance, to enable the performers to keep time. Formerly various graces or ornaments in music, such as the reversed shake, were called by this inconvenient name.

Beatenberg, or SANKT BEATENBERG, is a small Swiss health-resort a little to the north of the Lake of Thun, about five miles WNW. of Interlaken.

Beatification, an inferior degree of canonisation introduced in the 12th century, is a solemn act in the Catholic Church, by which the pope, after scrutinising the virtues and miracles of a deceased person, pronounces him to be among the blessed. After this his cultus is authorised, not universally as in canonisation, but in some district or order of the church. Beatification is generally a step towards Canonisation (q.v.). Thus Joan of Arc was beatified on the 18th April 1909, sanctified in 1920.

Beating the Bounds. See BOUNDS.

Beaton, or BETHUNE, DAVID, Cardinal and Primate of Scotland, was a younger son of John Beaton of Balfour, in Fife. Born in 1494, he was educated at the universities of St Andrews and Glasgow, and afterwards studied theology and law at Paris. His tact and general abilities recommended him to the Duke of Albany, regent during the minority of James V., who in 1519 appointed him resident for Scotland at the French court. In 1525 he took his seat in the Scots parliament as abbot of Arbroath; his uncle, James Beaton, on being translated three years before from the archbishopric of Glasgow to St Andrews, having resigned to him that abbey, with half the rents. In 1528 Beaton was appointed Lord Privy Seal, and he is said to have been the adviser of James V. in instituting the College of Justice or Court of Session in Scotland, the idea of which was suggested by the constitution of the parliament of Paris. Beaton subsequently was twice sent ambassador to France, to negotiate James's two marriages. During his residence at the French court, he was admitted to all the privileges of a French citizen, and in 1537 was appointed by Francis I. Bishop of Mirepoix in Foix. After his return, he became coadjutor to his uncle in the see of St Andrews, and in 1538 was by Pope Paul III. elevated to the dignity of a cardinal. On his uncle's death in 1539, he succeeded him as Archbishop of St Andrews and Primate of Scotland, and soon commenced a persecution of the Reformers, already numerous and increasing. That he might be invested with supreme authority in all matters ecclesiastical, he obtained from the pope the appointment of *legatus a latere* in Scotland, and induced the king to institute a Court of Inquisition, to inquire after heretics in all parts of the kingdom. To maintain the French influence, and prevent all danger to the Catholic Church in

Scotland from a friendly connection with England, he contrived to frustrate a proposed meeting of King James with his uncle, Henry VIII., and even prevailed on the former to declare war against England. On James's death, after the disastrous overthrow of the Scots at Solway Moss (1542), Beaton produced a forged will, appointing himself and three others regents of the kingdom during the minority of the infant Queen Mary. The nobility, however, rejected the fictitious document, and elected the Earl of Arran regent, who then professed the reformed faith. Beaton next month was arrested and imprisoned, accused, among other charges, of a design to introduce French troops into Scotland, in order to stop the negotiations then in progress with Henry of England for a marriage between the young Prince of Wales and Queen Mary. He was soon after liberated, and reconciled to the regent, whom he induced to abandon the English interest, and publicly to abjure the reformed religion. On the young queen's coronation in 1543, Beaton was again admitted of the council, and appointed chancellor. During a provincial council of the clergy held at Edinburgh, at which he presided, he caused the celebrated preacher, George Wishart (q.v.), to be apprehended at Ormiston, and conveyed to the castle of St Andrews, where he was burnt at the stake, Beaton and other prelates witnessing his sufferings from a window. A conspiracy having been formed against him, at the head of which were Norman Leslie, Master of Rothes, and Kirkaldy of Grange, Beaton was assassinated in his own castle of St Andrews, 29th May 1546. Though endowed with great talents, Beaton possessed little learning, and the ascription of certain works to him rests on no valid authority. Haughty, cruel, and intolerant, he was also licentious in the extreme. He had seven natural children, four sons and three daughters—the latter married into families of distinction. One of his sons turned Protestant. The popular feeling about his death is expressed in the lines attributed to Sir David Lyndsay: 'Although the loon is weel away, The deed was foully done;' and Knox speaks of the assassination as a 'godly fact.'

See the Life by Herkless (1891); Herkless and Hannay, *The Archbishops of St Andrews* (vol. iv. 1913); the articles SCOTLAND, JAMES V., MARY QUEEN OF SCOTS, KNOX, and works there cited.

Beaton, JAMES, an uncle of the cardinal's, took his M.A. at St Andrews in 1493, and rose rapidly to be Archbishop of Glasgow (1509), and of St Andrews (1522). One of the regents during James V.'s minority, he upheld the Hamilton against the Douglas faction. To the Edinburgh street-fight between them, famous in history as 'Cleanse the Causeway' (30th April 1520), he came wearing mail beneath his episcopal habit; but when Gawain Douglas, the poet-bishop of Dunkeld, besought him to stay the impending conflict, he swore on his conscience that he knew nothing thereof. His armour rattling as he struck his breast called forth the rebuke, 'My lord, your conscience clatters.' The Hamiltons lost the day, and Beaton himself owed his life to Bishop Gawain. In 1526 he had, says Pitscottie, 'to keep sheep in Balgrumo,' whilst the Douglases plundered his castle; but he was soon reinstated in his see, and figured as a zealous supporter of France, and an opponent of the Reformation, Patrick Hamilton and three other Protestants being burnt during Beaton's primacy. He died at St Andrews in 1539.—Another JAMES BEATON, nephew to the cardinal, was born in 1517, and in 1552 was consecrated to the archbishopric of Glasgow. He stood high in favour with the queen-regent, Mary of Lorraine, and it was to him that she handed the Lords' remonstrance (1557) with the remark, 'Please you, my lord, to read a pasquil.' On her death in 1560 he withdrew to Paris, and there he dwelt as Scottish ambassador, honoured by all men for his blameless life, till his death on 30th April 1603. See Herkless and Hannay, *The Archbishops of St Andrews* (vol. iii. 1910).

Beattie, JAMES, poet and essayist, was born at Laurencekirk, Kincardineshire, 25th October 1735; studied at Marischal College, Aberdeen (1749–53); was for five years schoolmaster to Fordoun parish; in 1758 was appointed a master of Aberdeen grammar-school, and in 1760 professor of Moral Philosophy in his old college. He had published three or four volumes of verse, when in 1770 appeared his *Essay on Truth*, an onslaught upon Hume, which met with most extravagant success. The author himself naturally shared the popularity of his essay. He was introduced to George III. (1773); dignitaries of the English Church solicited him to take orders, with promise of high preferment; but neglect has long since overtaken his treatise, which indeed is essentially commonplace. In 1771 appeared the first part of *The Minstrel*, and in 1774 the second. It is rich in picturesque descriptions, while the versification has a quiet fullness of melody. The poem describes 'the progress of a poetical genius born in a rude age, from the first dawning of fancy and reason, till that period at which he may be supposed capable of appearing in the world as a minstrel.' Beattie intended to add a third part, but circumstances hindered him. In 1776 he published a series of essays on *Poetry, Music*, &c., in 1783 *Dissertations Moral and Critical*, in 1786 *The Evidences of the Christian Religion briefly and plainly stated*, and in 1790–93 *The Elements of Moral Science*, all of which works are written in a clear and elegant style, and with a high appreciation of the good and beautiful. He died 18th August 1803. See his Life by Sir William Forbes (1806), Miss Margaret Forbes's *Beattie and his Friends* (1904), and (for letters) Mackie's *James Beattie the Minstrel* (1908).

Beatty, DAVID, first EARL, admiral, born in County Wexford in 1871, entered the navy in 1884, and served in the Sudan (1896–98) and China (1900). Attaining flag rank at the age of 38, he took command of the first battle-cruiser squadron in 1912, distinguished himself in the battles of Heligoland Bight (28th August 1914), Dogger Bank (24th January 1915), and Jutland (31st May 1916), and in 1916–19 was Lord Jellicoe's successor as commander-in-chief of the Grand Fleet. Knighted in 1914, he was given in 1919 the Order of Merit, the rank of Admiral of the Fleet, an earldom and £100,000, and was First Sea Lord from 1919 to 1927. For his battles, see TACTICS, WORLD WAR.

END OF VOL. I.

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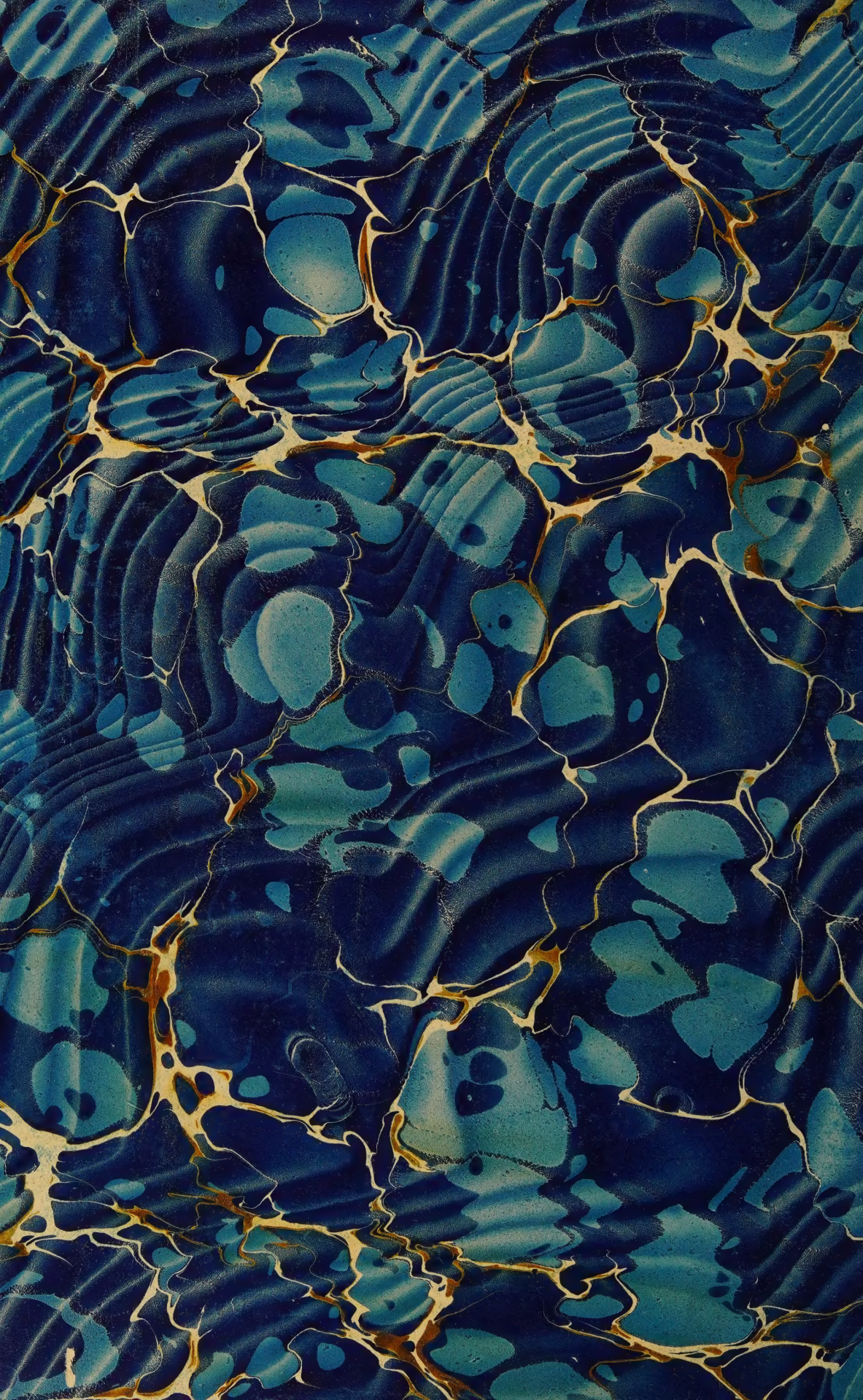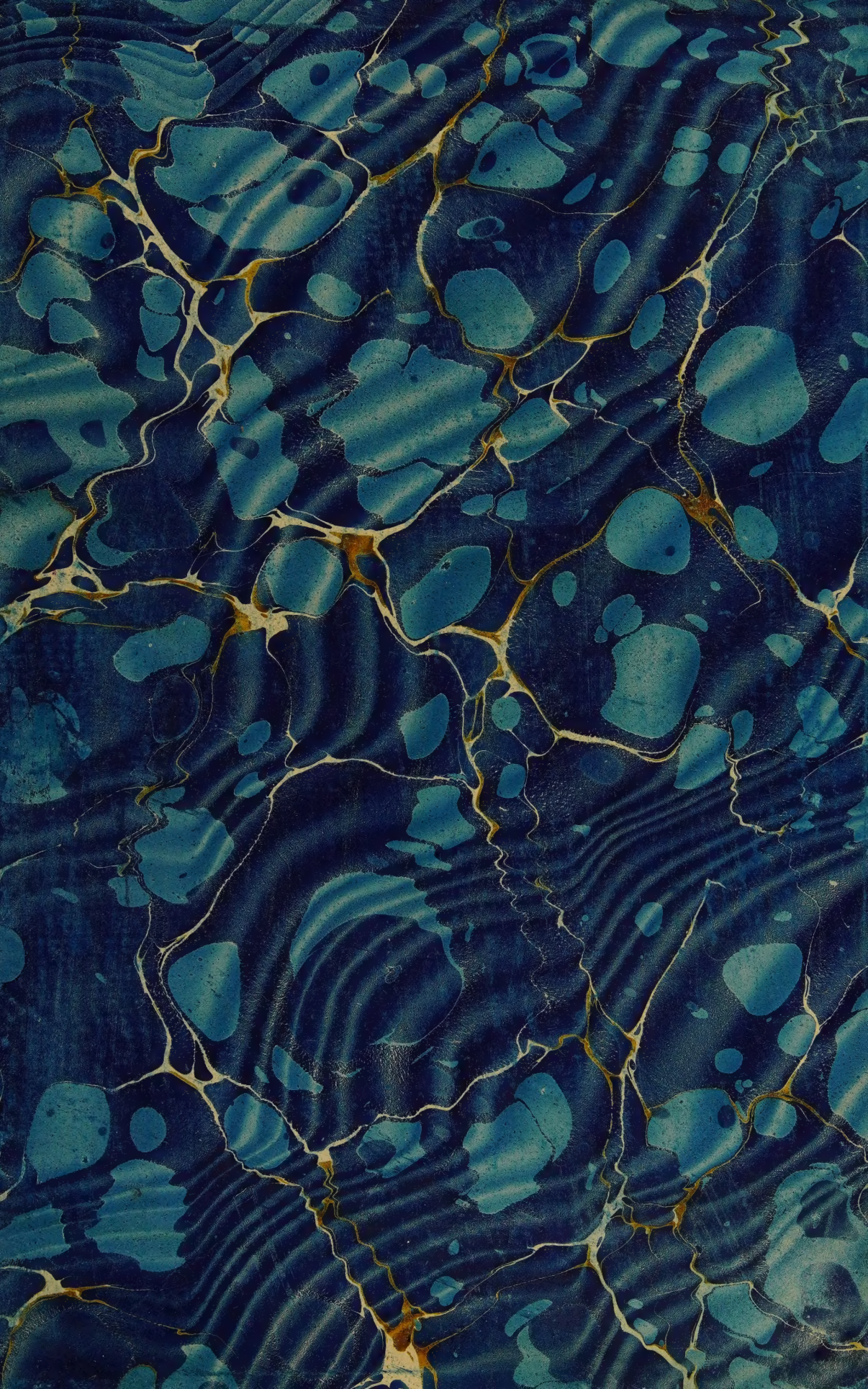
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